The New Zealand Journal of Agriculture

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Work of Rehabilitation.

The Flood Disaster of the Esk Valley.

R. P. Hill, Fields Instructor, Hastings.

Fig. 1.—Where the silt came from—erosion on the "Rocky Ranges" bordering Lake Tutira.

FEW people, apart from those directly concerned, can have any adequate conception of the great damage which was caused to farm-lands and buildings as a result of the very heavy rain and subsequent flooding which took place in Hawke's Bay during Anzac Day week-end.

The Esk River, usually a slow-running stream not more than 2 ft. in depth over the greater part, rose by the almost inconceivable amount of 30 ft. or 40 ft., spread rapidly over the Esk Valley, rising almost to the tops of some houses, and then quickly receded, leaving many homes buried up to the windows in silt and drowning a large number of stock.

The Esk Valley has suffered previously from floods, but nothing of such a devastating nature has occurred in the memory of settlers. Some 2,000 acres were flooded, and when the floods receded a covering of silt varying in depth from 2 ft. to 10 ft. was left. This silt completely covered all pastures and penetrated into the houses.

Extent of Flooded Area.

The area so flooded extended from the beginning of the flat land several miles up the Esk River right down to the mouth, which was apparently blocked for some time by the debris. The blocking of the mouth caused the flood-waters to back up and become still, and it was at this stage that the heavy burden of silt from the numerous slips was deposited. Prior to breaking through the shingle-bank to form a new outlet to the sea the impounded waters began to flow south through Bay View into the recently dewatered Ahuriri Lagoon area.

All the farming-lands are held in small areas, and are devoted to market-gardening, dairying, fat-lamb raising, and grass-seed growing. The farmers' dwellings were picturesque little homesteads, surrounded by pretty gardens and shelter-trees, and it can be realized what a disaster such a flood must have meant to them.

There was practically no warning of the approaching flood, which, fortunately for the settlers, reached its maximum height in daylight. Rescue parties with boats removed any settlers who had been trapped in their houses or hay-lofts where they had taken refuge.

Work of Relief Committee.

As soon as the extent of the damage was realized, a Flood Relief Committee was set up to consider the rehabilitation of

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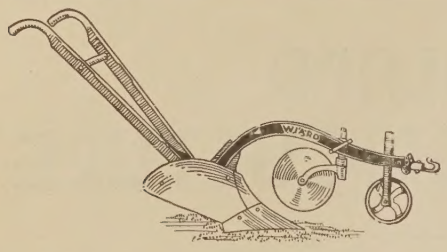

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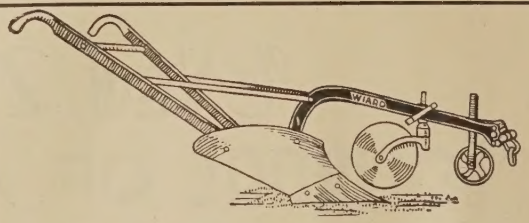

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Fig. 2.—A comprehensive view of the extensive silting in the Esk Valley.

the settlers. The Committee included the local Members of Parliament, representatives of the settlers, officers of several Departments, local-body members, and private citizens. It was decided that the first work to be done was to resow the silted areas before the silt became too dry, and as an emergency measure the Department of Agriculture was authorized to arrange for the purchase and early distribution of seed for this purpose. Some 8,000 bushels of certified rye-grass seed and 8,000 lb. of white-clover seed was immediately purchased to resow the Esk Valley and also areas in the Tangoio, Puketapu, and Wairoa districts, which had suffered in a similar manner.

Sowing was started immediately wherever it was possible, with a mixture of 2 bushels of certified rye-grass and 2 lb. of white clover to the acre. It was found, however, that a large amount of silted-up area had been left with a very uneven surface. Various elevations of the silt ran across farms with a steep drop of several feet on to lower elevations. Had these been sown as they were, the land would have been left too rough for economic farming.

The Public Works Department was then called upon, and provided tractors with grader attachments, which have done splendid work in levelling off the areas to a condition where a mowing-machine may be operated when necessary. These tractors have also done excellent work in hauling drifted logs into heaps. Excavators and drag-line scoops have operated to let surface water away.

The problem of restoring the houses to a habitable condition cannot be overcome without considerable expense. The houses are surrounded by upwards of 5 ft. of silt—standing, as it were, 5 ft. below ground-level—and it will be necessary to raise each house something like 6 ft., as well as to rebuild all chimneys.

Problem of New Fences.

Fences which had been completely covered by silt were the next problem for salvage, and an ingenious method (described on page 433 in the June issue of the *Journal*) of lifting the submerged posts was evolved.

A great number of posts were broken off by the force of the flood, and these must be replaced by the purchase of new material. Not only in the Esk Valley but on all flooded areas will this be necessary. The loss in fencing-material through slips on the hill country has also been considerable, and here again the early purchase and distribution of fencing-material to settlers requiring assistance by way of loans has been arranged through the Department of Agriculture.

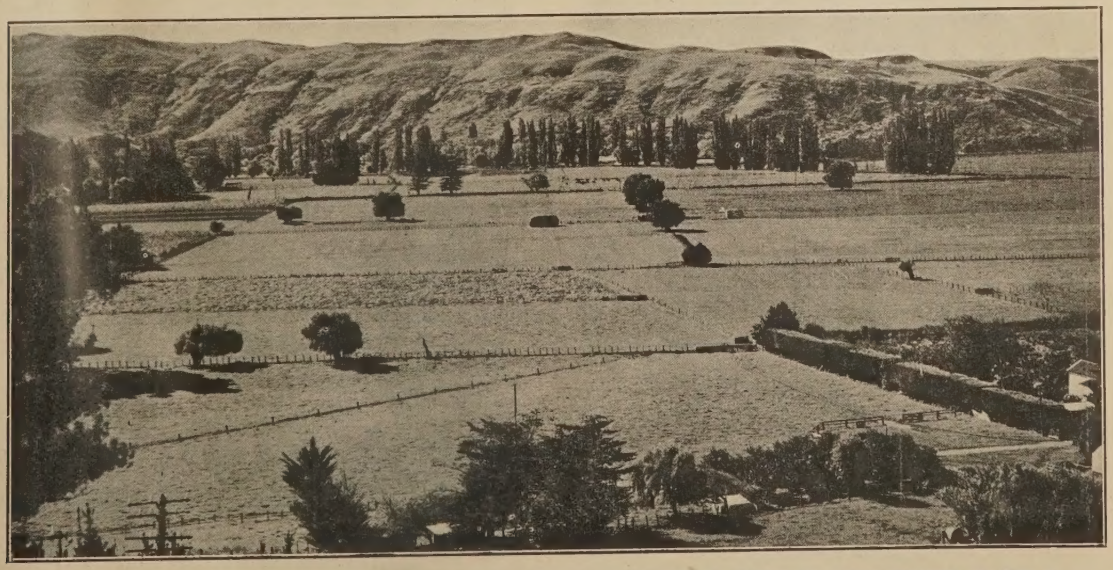

Fig. 3.—A view across the Esk Valley before the flooding taken from almost the same position as Fig. 2.

The Flood Relief Committee meets frequently to deal with all applications for assistance. Every case is dealt with on its merits, and the farmer is granted assistance by way of loan, according to his ability or inability to finance himself, and in every case where a farmer is granted assistance for fencing-material he must make application to the Department of Agriculture, as in the case of grass-seed, for the number and kind of posts, wire, &c., required to place his fences in order.

Why Seed was Sown Immediately.

It may be questioned why the immediate sowing of seed was recommended, as the season was late. Previous floods have proved the value of sowing on silt immediately it could be walked on; if left too long there is the danger of its drying out and, being a sandy silt, blowing away. Spring sowing would be very risky, with the fear of a subsequent dry summer and loss of the pasture. Further, if left too long the land would be covered rapidly with weeds, which might necessitate ploughing to eradicate. Ploughing would be practically impossible because of the hidden timber, debris, wire, &c. An analysis of the soil reveals the fact that, although the silt is largely sand, it contains a high lime percentage and the average quantity of phosphate

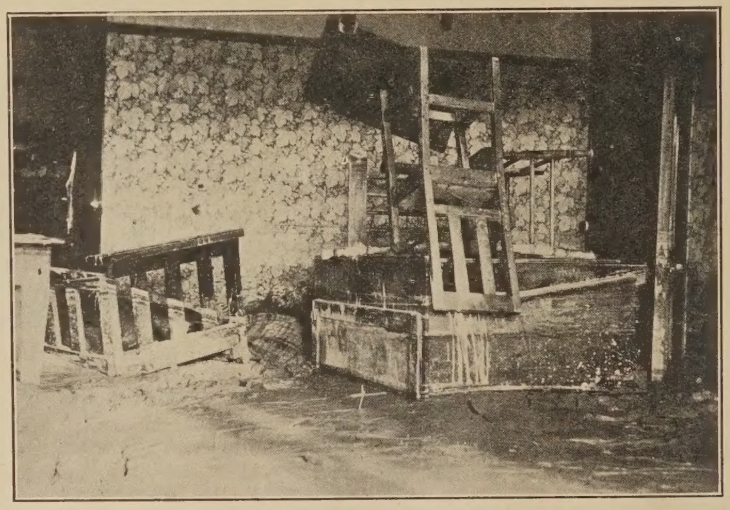

Fig. 4.—A typical example of damage to furniture.

Fig. 5.—A house in the Esk Valley silted up and surrounded by debris.

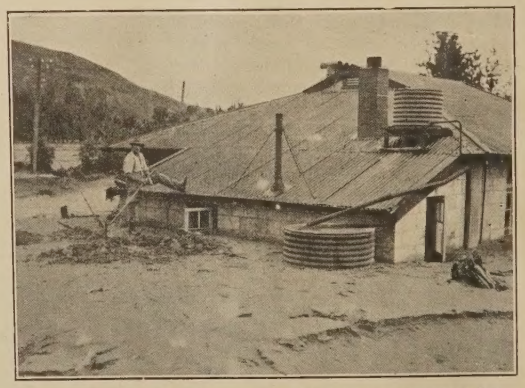

Fig. 6.—Another house at Eskdale surrounded by a deep deposit of silt.

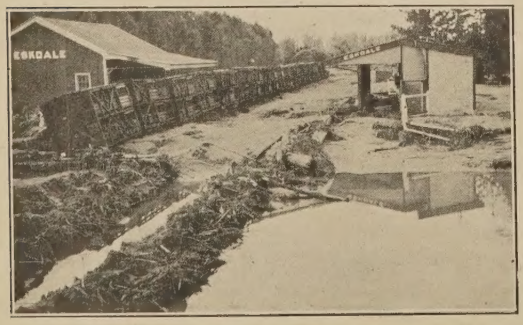

Fig. 7.—The Eskdale Railway-station, with trucks derailed by the silt.

Fig. 8.—The main Napier Road covered in silt to the depth of the road fences.

and potash. The soil is, however, somewhat devoid of humus and, therefore, of nitrogen.

As a result of the floods the settlers of the Esk Valley have completely lost their livelihood, and it was felt that, even if a percentage of the grass sown was lost, that which remained would at least afford some measure of production in the coming year.

Need for Top-dressing.

The necessity of top-dressing in the spring all the grass sown has been realized, and provision is being made through the loans for this to be done. The need for a dressing of superphosphate to promote a white-clover growth cannot be too strongly emphasized. Nitrogen would appear to be the limiting factor, for without nitrogen the rye-grass will not thrive, but a good strike and early growth of white clover will rapidly correct this fault. Under grass, adequately supplied with nitrogen through good, strong white-clover growth as a result of regular top-dressing, it is confidently anticipated that most of the silted areas will develop once more into quite fertile land.

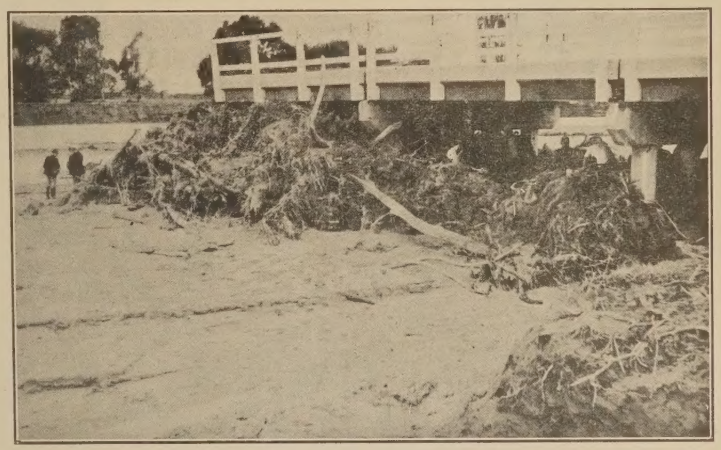

Fig. 9.—All that is left of the bridge over the Esk River. More than half the bridge was washed away, leaving no trace, and approximately 11 acres of land were washed out to sea at this point.

The illustrations accompanying this article show the appearance of the Esk Valley a few weeks prior to the disaster and the same area a few days after the flood. Other pictures indicate the extent to which the houses in the valley were inundated and left half-buried in the silt, and give some impression of the tremendous task which faces the settlers in their effort to bring about the rehabilitation of their former homes.

Thanks are due to Mr. G. Home-Douglas, of the *Daily Telegraph*, for lending photographs.

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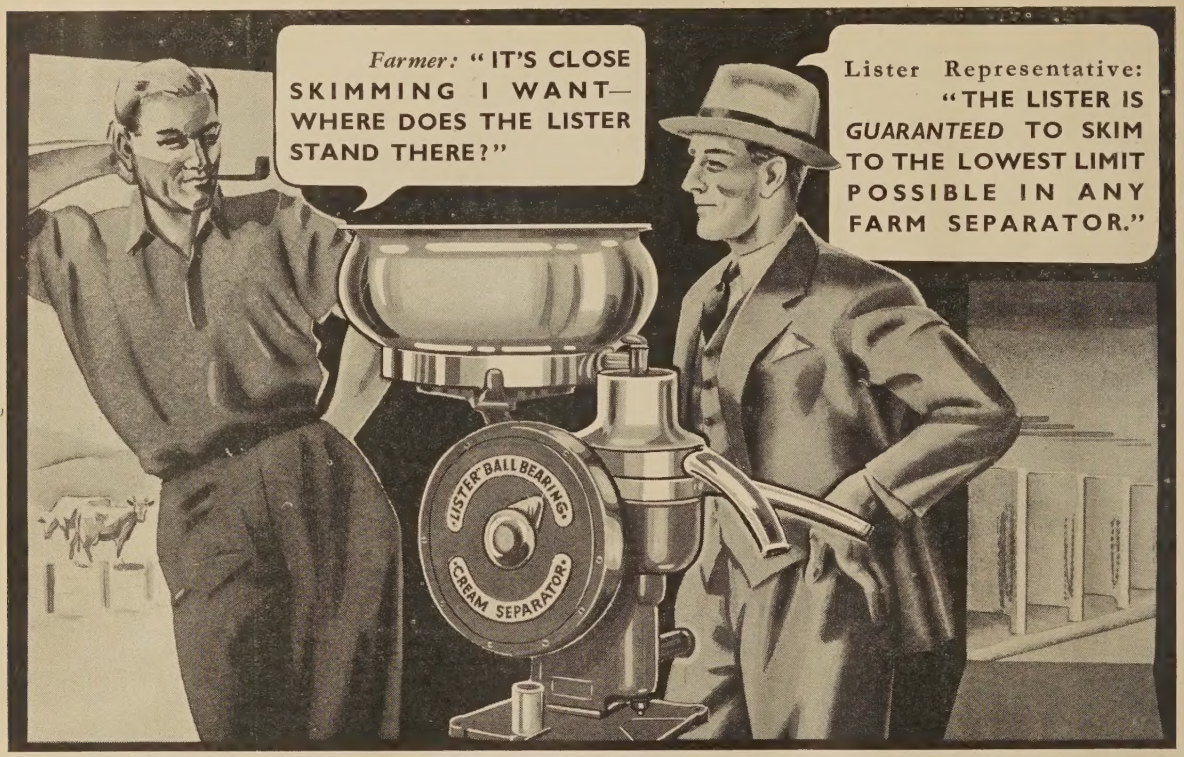
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Cavalcade of Agriculture.

Striking Pageant by Young Farmers' Clubs.

By W. J. Croucher, Palmerston North.

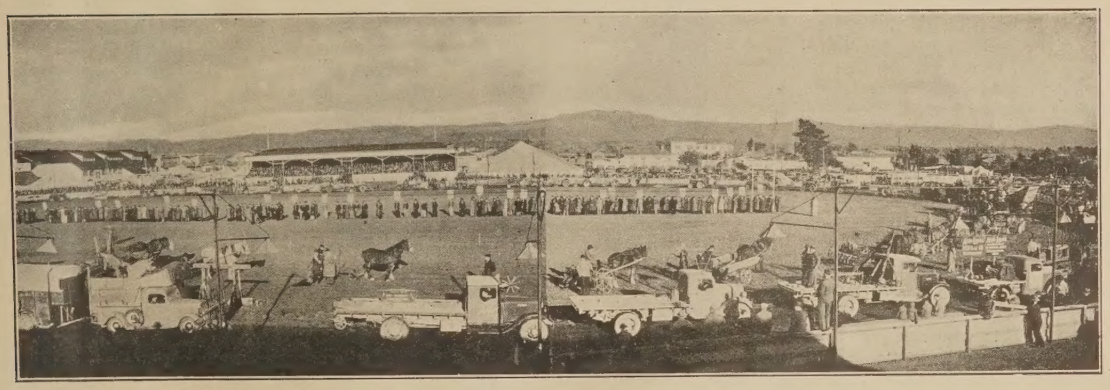

Fig. 1.—A comprehensive view of the Cavalcade of Agriculture, showing modern implements and old.
[Photo by H. Drake.

IT is an accepted truism that there is no stationary period in life or in business. The world and its affairs is for ever moving and can never remain still; consequently, the peoples of the earth must perforce adapt themselves to an everchanging order. To do otherwise is to become decadent and impotent. Accepting that principle as a basis for a few passing observations, let us briefly examine what effect the march of progress has exerted on the elementary science of agriculture.

In this more or less casual survey it is not proposed to make any attempt to trace the progressive stages in the development of agriculture from primitive times, but merely to try to focus a few thoughts upon what has been done within living memory by agriculturists in New Zealand during the past sixty-five years or so. These reflections are engendered by the magnificent pageant conceived, staged, and directed by the executive and members of Young Farmers' Clubs on the Manawatu and West Coast A. and P. Association's Showgrounds at Palmerston North on 16th June.

In all probability it never occurred to these virile young men when they offered to organize a cavalcade portraying the evolution of arable farming that they were about to stage an event which would by general consent prove to be one of the most unique and outstanding object lessons of its kind that has ever been enacted in this or any other country.

Memories Kindled.

Planned originally for the specific purpose of providing an afternoon's entertainment on the Show programme, this parade not only demonstrated the evolutionary processes which have influenced the science of farming during recent years, but it unconsciously went far deeper by kindling among members of an older generation thoughts and memories of times when they, too, in the springtime of life, were helping to lay the foundations of agriculture in the world of yesterday.

Appropriately, pride of place in the long procession was given to, and jointly shared by, a team of six splendid specimens of draught horses, and a full span of twelve bullocks, representative of the important part played by these faithful and adaptable domestic animals in the service of man. Then followed single- and double-furrow ploughs of ancient design and workmanship, which seemed to be strangely out of place when compared with the mammoth modern mechanically drawn implements that have succeeded them. And so with every other individual exhibit as it was drawn past a given point.

The sickle and the scythe has, in turn, been superseded by the back-delivery tilter mower, then by the reapers-and-binders with wire and twine sheaf-binding devices, until we saw at last a machine capable of reaping and binding a 10 ft. or 12 ft. swarth of grain in a single cut. Or, again, a combined harvester which garners, threshes, and bags the grain in one complete operation. The same evolution applies to implements designed for tillage, seed and manure distribution, and all other agencies relating to farm practice.

Influence of Inventive Genius.

At the beginning, the limits of farm production rested with the plough. When the invention of modern ploughs solved that problem it was found that even under the crudest methods of tillage it had always been easier to produce the crop than it had been to harvest it. Inventive genius therefore directed its attention to the final phases of crop-production, and evolved more efficient types of reaping and threshing machinery. It appears to have followed that the solution of one farm problem inevitably makes necessary the solution of other related needs, and therein is the answer to the steady progress in the farm-implement industry.

The harvester-thresher is the reaper's latest descendant in the direct line, and is probably the most masterful and spectacular achievement in power farming. One hundred years ago, one man with a hoe and a scythe and flail could attend 1 farm acre, or perhaps a 2 acre patch. To-day, with the triumphs of human ingenuity, he can, if he wishes, accomplish single handed at least 100 acres of cropping.

New Zealand's First Plough.

It seems appropriate at this time, when progressive methods of agriculture are under review, to refer to the first time a plough was used in New Zealand. In the Manawatu and West Coast A. and P. Association's committee-room there is an original page from the diary of the Rev. J. G. Butler, which reads :—

"On the morning of Wednesday, the 3rd day of May, 1820, the agricultural plough was, for the first time, put into the land of New Zealand at the Kiddi Kiddi, and I felt much pleasure in holding it after a team of six bullocks—brought down by the Dromedary—I trust that this auspicious day will be remembered with gratitude and its anniversary kept by ages yet unborn. Every heart seemed to rejoice on the occasion—I hope it will still continue to increase and in a short time produce an abundant harvest.

"J. G. Butler."

The Kiddi Kiddi referred to is now known as Kerikeri, in the Bay of Islands, and the Dromedary is believed to have been a British sloop of war which was then in New Zealand waters. If the Rev. J. G. Butler could have witnessed the spectacle at the showgrounds his heart would have again rejoiced at the unmistakable evidence that the hopes and desires of the first ploughman in New Zealand have been more than realized. The harvest has been prolific.

Fig. 2.—An old treadmill in operation.

Cultivation Begins.

About fifty years after the historic day when the first furrow had been turned at Kerikeri, cultivation began in the fertile soil of the Manawatu, and it was one of the earliest ploughs used for this purpose that found an honoured place in the van of the procession last Thursday. This rusty, cankered, time-worn, old-fashioned implement, which to the present generation and other casual onlookers was simply regarded as one exhibit of a novel display, held quite a different attraction and meaning to many who were present, because of memories which were recalled.

They saw momentarily, as in a dream, another and still more realistic pageant, representing the actual story of the early life and development of this fair country in which they and their parents before them were actual participants. They lived for a while in other days, and saw, in imagination, the complete picture covering sixty-odd years of pioneering hardships and ultimate realization unfolded page by page. They were participating in what has been described as an epic in successful colonization that has not been excelled elsewhere in the Empire.

To them the pageant staged on the showground in 1938 represented a vital living force reminiscent of the not far distant days when men and women of an older generation strove with those primitive implements to win their daily bread from mother earth. Acre by acre they conquered the wilderness and eventually won through to success. Some fell by the wayside, but they, nevertheless, performed their part in assisting to pass on

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for all time an example and a heritage for all who are to follow. They unconsciously built their own monuments in every acre brought into cultivation.

Indebtedness to Pioneers.

The youth of to-day who staged the cavalcade have, perhaps unwittingly on their part, done a wonderful service to the whole community by offering this impressive and fragrant reminder of the indebtedness of all to the pioneering spirit which animated and sustained the forerunners of our agricultural and industrial enterprise. Lest we forget, steps are now being taken to perpetuate the memory of all pioneers by the erection of a monument on a site overlooking the scene of their endeavours which in the days that are to come may serve to remind all who follow on of the obligation they owe to those who blazed the trail and passed on our magnificent heritage. It is the least that we can do.

We have just taken a fleeting glance at the phantom forms at the head of the procession. Passing by the inanimate, cold-blooded, mechanical monsters which have taken the soul out of arable farming by the introduction of mass production through the agency of power-driven implements, we eventually come to another human aspect of the picture.

A goodly company, one thousand strong, representative of the flower of the youth of both sexes, marches past in ordered formation. These are the members of Young Farmers' Clubs and the Women's Division, who have assembled from every part of the province to demonstrate the force and purpose of the national movements they have inaugurated—a pageant of youth presenting yet another scene which had not previously been staged for a similar purpose on any showground in New Zealand.

Again the sentimentalist falls into a reverie. He remembers the fateful years of 1914–18 when another call to youth was made in the cause of Empire and recalls how well the summons was responded to. He is reminded again of the regiments of young men and women marching past to join the ships that would transport them to the forbidding shores of Gallipoli or the war-scarred fields of France, and he feels again the soul-stirring emotions with which their departure was witnessed. Let that unpleasant memory pass. God forbid that such scenes will ever be witnessed again.

Arts of Peace.

Last week we saw a regiment of young men who have elected to apply their brains and energy to the promotion of the greatest and most important of all the sciences—that of agriculture. They are training themselves in the arts of peace; they are preparing to take up the burden where their parents and grandparents left off.

The forthcoming centennial marks the completion of a glorious age of agricultural expansion in the Dominion, and ushers in another golden period which will employ an entirely different set of controlling factors from the one preceding it. Mass production conducted on exacting scientific principles is now replacing the older order, but the fundamentals are still the same. Mother earth will ever remain the one and only permanent and dependable source of real wealth. But she demands an exacting recognition; When she gives freely she also requires free acknowledgment by way of service. Otherwise the storehouse would become depleted.

Young farmers of to-day and to-morrow must see to it that they employ with discretion the implements which modern inventors have made available, so that, while working in conjunction with agricultural science, they may be enabled to preserve an equitable balance and preserve intact the latent fertility of the soil for those yet to come.

Message to Young Farmers.

To the one thousand farmers in the making who paraded at the showground and all other young men engaged in the procession let me quote a few lines written by an ancient seer:—

"I believe that the country, which God made, is more beautiful than the city, which man made; that life out of doors and in touch with the earth is the natural life of man. I believe that work is work wherever we find it, but that work with nature is more inspiring than work with the most intricate machinery. I believe that the dignity of labour depends not on what you do, but how you do it; that opportunity comes to the boy on the farm as often as to the boy in the city; that life is freer, and happier on the farm than in the town; that my success depends not upon my location, but upon myself—not on my dreams, but on what I actually do—not upon luck, but upon pluck . . . "

On behalf of the Manawatu and West Coast Agricultural and Pastoral Association, allow me to convey the thanks of that body to all who were responsible for staging the pageant, embracing the Department of Agriculture, Young Farmers' Clubs, Junior Women's Division, owners of horses and implements, and all others who contributed to its outstanding success.

In conclusion, may I be permitted to add a personal note of thanks not only from myself, but on behalf of the unknown thousands around the ringside who have been inspired by the lessons and implications arising out of the most unique and thought-provoking event that has even been presented here or elsewhere.

Historical Significance.

The pioneers of old were not conscious or concerned about making history, but we know full well that to-day we are reaping the harvest of their endeavours. In like manner you, representatives of youth, have more or less accidentally established something of a distinctly historical significance in your well-planned cavalcade. The cynic may say that I am a sentimental old fool; what matters if he does? He cannot rob me and others who think the same way of the lasting enjoyment that your "novelty" event provided.

If I might venture a suggestion it would be to prefer the request that the promoters of the pageant never permit the parade to become commercialized or cheapened by too frequent repetition. It is and must ever remain the Young Farmers' Day on the showgrounds, and as such deserves to be kept free from all other motives that are foreign to its original conception and resulting influence.

The old-timers of yesterday salute the youth of to-day and to-morrow! Carry on. The field is fertile and the need is great!

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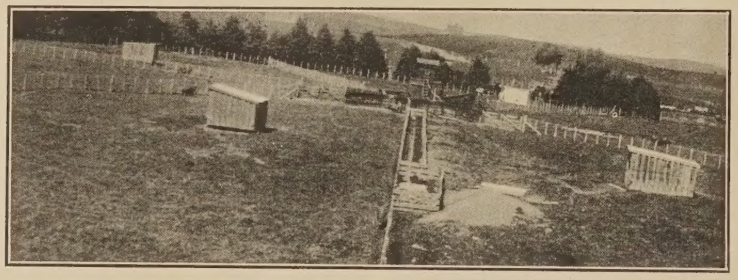

Fig. 1.—A comprehensive view of the general lay-out of the pig-yards and small paddocks.

TWO years ago Mr. A. R. Vosper, of Putaruru, modelled and built a pig-yard and small paddocks on a central feeding-system. His object was to facilitate the keeping and feeding of pigs, and after the two years' trial Mr. Vosper is thoroughly satisfied with his venture.

A store-house, 8 ft. by 8 ft., was built in a 15 ft. square yard on a concrete platform 33 ft. square in the middle of a 2½ acre paddock. The concrete floor thus extends 9 ft. outside the yard on all sides. The floor has a fall of 4 in., with raised outside edges to confine rain and flushing waters. The feeding-troughs are placed on this outside concrete floor, and all drainage is conveyed along an open concrete drain to a two-chambered sump some distance away. The first sump acts as a collector of solids, and the second as a catchment of water overflow. These sumps need be cleaned out only once a year. For the two years during which this drainage-system has been in operation it has given entire satisfaction.

The yard is built of 6 in. by 1 in. timber, with similar divisional walls extending across the outside concrete floor from the yard to the divisional fences of the paddocks, of which there are six. A small holding-yard and race, in which pigs can be easily handled at any time, is built inside the central yard, utilizing an outside wall to form one wall of the holding-yard. A weighing-box may be placed in the race leading to the loading-race, and gates are provided for access to paddocks. Thus, the yarding and handling of pigs is rendered simple and expedient.

Conveyance of Milk Food.

For feeding-purposes the skim-milk is pumped from the milking-shed through a ¾ in. pipe to a 120 gallon covered wooden vat on top of the store-house, and is delivered at feeding-times by means of a 2 in. hose to a wooden conveyor or trough 4½ in. wide and 4 in. deep which is built along the top of the yard fence and which has a 6 in. fall, thus allowing the free flow of milk. From this conveyor the milk is taken direct into the pig-troughs by 1¾ in. pipes. Wooden slats, or stops, are placed on the low side close to the intake of each pipe, so that milk can be conveyed to any single pig-trough as required.

The pigs are not fed on skim-milk alone. Small proportions of bran, meat-meal, and barley are added at each feeding-time by putting them into the milk-conveyor as the milk flows along from wooden vat to the pipes leading to the pig-troughs. This method has proved quite satisfactory. Mr. Vosper is not satisfied with the use of the 2 in. hose for the conveyance of milk from

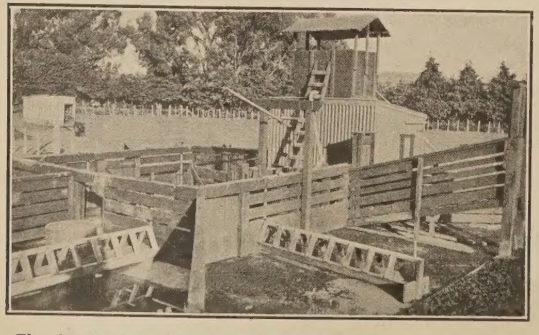

Fig. 2.—A closer view of the central feeding-system and the store-house, from which the feed is conveyed to the troughs.

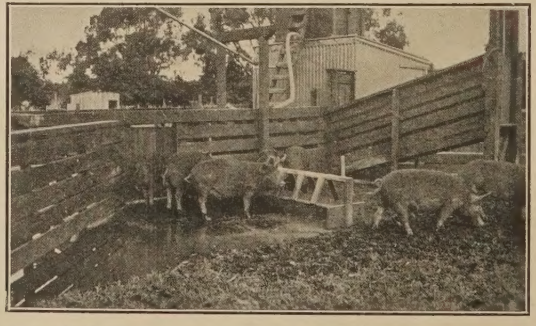

Fig. 3.—Pigs feeding at the troughs, which are placed on concrete and are partitioned off with battens.

the wooden vat to the milk-conveyor along the top of the yard fence, and considers that two 2 in. galvanized pipes would serve the purpose better. He proposes making this alteration at an early date.

The yards and troughs are easily kept clean. The wooden vat may be filled with water pumped from the milking-shed and the whole place flushed out in a short time. The milk-pipes leading from the milk-conveyor to the pig-troughs are kept free and clean by occasional flushing with molasses and water. Sixteen pigs may be fed at an individual trough 9 ft. in length. Each trough is portioned off with battens, allowing sufficient space (10 in.) for one pig, and the troughs can be flushed with water and quickly cleaned. An outlet for the disposal of the water is provided at one end.

No Excess of Mud.

Troughs from which weaner pigs are to be fed require to be portioned off with battens about 7 in. apart. Although much heavy rain has been experienced during the two years, there has never been an excessive accumulation of mud. The approach to the feeding-troughs on the concrete, however, is sometimes cut up to a certain extent.

Each paddock is provided with a gate sufficiently wide to allow the transport of a top-dresser and other farm implements, and is also provided with the usual movable sty or shelter-shed. The paddocks are spelled as the keeping of the number of pigs will allow. Pastures are controlled by grazing with sheep or dry stock. They are occasionally harrowed, and receive a top-dressing of 5 cwt. of lime per acre each year.

For farmers who favour the small-paddock system for fattening pigs the layout is very satisfactory, and the simplicity of feeding and handling is excellent. Seventy to eighty pigs are sometimes on hand at one time, and the time taken in each feeding is usually from ten to fifteen minutes.

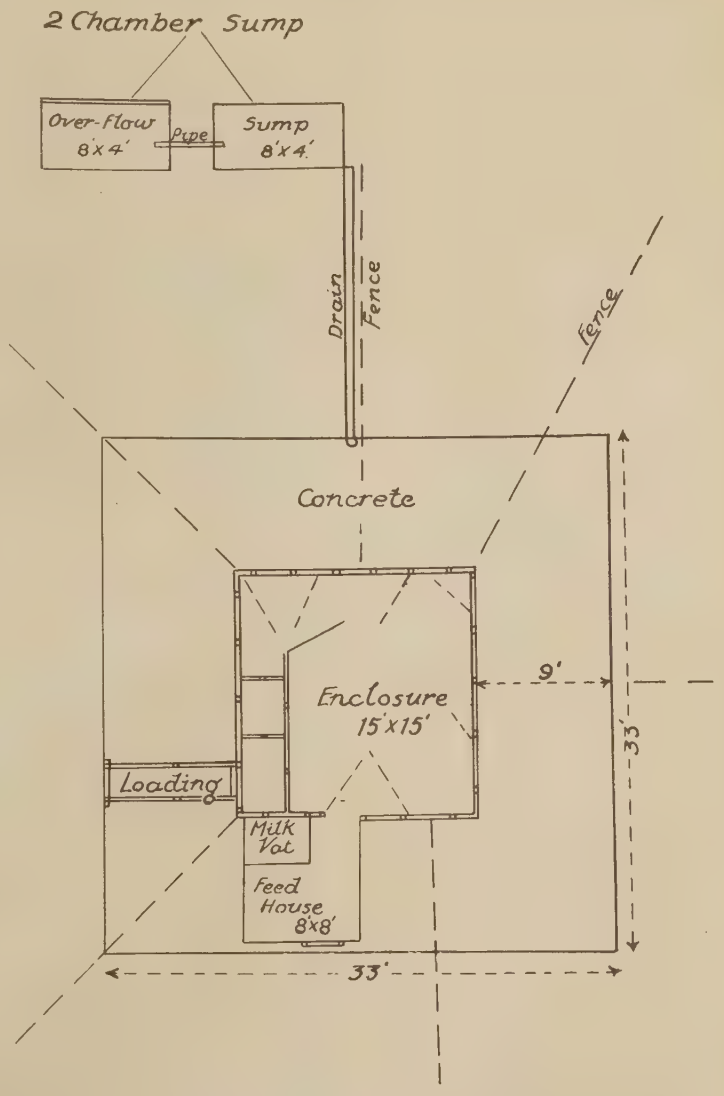

Fig. 4.—A sketch-plan of the lay-out of the pig-yard and small paddocks on a central feeding-system.

Bitumastic Veneer.

THE Matarau Young Farmers' Club asks whether experiments have been conducted to prove the success or otherwise of using a bitumastic veneer over concrete — first, to provide a warm, dry, and waterproof floor or bed, and, secondly, to cover floors and troughs to resist the corrosive effects of the milk contents ?

The Live-stock Division replies that no experiments are known to have been carried out in connection with a bitumistic paint. Bitumen drums have been used as containers for milk-curds which have been saved for the winter feeding of fowls, and after a storage period of some months the drums have still retained the covering of bitumen. Where this has been used on troughs, either wood or concrete, it has not proved satisfactory, as there is a tendency for the bitumen to peal off, especially with concrete troughs.

Farm Shelter and Shade.

Example in Bay of Plenty District.

C. WALKER, Fields Division, Bay of Plenty.

PROBABLY the most impressive feature of a casual visit to the rural districts of the Bay of Plenty, especially during the early spring months, is the extensiveness and diversity of the farm shelter-belts. Plantations and shade-trees are encountered on almost every hand.

In contrast with many other districts which are generally regarded as offering striking examples of what farm shelter and shade really signifies, the Bay of Plenty is much less conventional in its interpretation of this important phase of farm-management. Thus, for instance, one sees in the coastal districts of Taranaki almost endless miles of well-ordered hedge-rows of African boxthorn, while farther inland in the same province barberry hedges are very much favoured.

A visit to the Hauraki Plains reveals the extensive use of pampas grass for farm shelter, but in the Bay of Plenty no such stereotyped method of providing farm shelter and shade has been adopted, with the result that to-day the bulk of the developed country is clothed in a wide range of tree and shrub species which, while effectively fulfilling the purpose of their establishment, also lend colour and beauty to the landscape.

Example of Pioneers.

It is therefore greatly to the credit of the pioneer settlers that they recognized early the many advantages associated with the establishment of shelter and shade plants, and their example in this direction is undoubtedly worthy of emulation by the more recent settlers at present actively engaged in carving out farms for themselves from the virgin country as nature endowed it.

While the soil and climatic conditions characteristic of the Bay of Plenty definitely lend themselves to the vigorous growth of trees and hedge-plants generally, it was by no means entirely these factors that prompted the early settlers in the district to make the provision of shelter and shade one of their first duties on taking up their undeveloped sections. Rather was it the realization that the health and production of pastures, crops, and live-stock could be secured only if all of the essentials to this end were so provided as to work together in the closest harmony.

Fig. 1.—An up-to-date pig layout well sheltered by a breakwind of tall Eucalypti and a row of Lawsoniana alongside to furnish bottom shelter. The eucalypt species are Macarthuri and Viminalis.

Fig. 2.—Barberry makes an ideal low hedge for sheltering individual paddocks on the farm. The hedgerows in foreground have just been trimmed, while the one on right has not been touched for some years. The weeping-willow to the rear of the haystacks provides wonderful shade in summer.

Fig. 3.—A corner of the barberry hedgerows illustrated in Fig. 2. Note the degree of trimming this hedge-plant is capable of enduring without in any way affecting the subsequent growth.

Fig. 4.— A barberry hedge on the left of the road for general shelter-purposes, and cabbage-trees, weeping-willows, hawthorn, and white-pine for shelter and shade on the right.

It was recognized that a congenial environment played a major part in the normal development of both plant and animal life, and that to create such an environment it was necessary to do something more than just drain the land where this was required, and establish pastures and crops and nourish them from time to time with artificial fertilizers. Shelter for protection from the chilling winds of winter and for shade during the hot summer months were obviously essential for the promotion of those conditions that alone were capable of adequately compensating a farmer for his industry and invested capital.

Fig. 6.—An ideal setting for a homestead, being well sheltered by the range of hills at the back and hedges of barberry and clumps of poplars, willows, and cabbage-trees on all other sides.

Fig. 5.—A fine grove of cabbage-trees with a few weeping-willows and poplars intermingled provides excellent summer shade, which is much appreciated by stock.

And so we have to-day in the rural areas of the Bay of Plenty that peaceful, park-like atmosphere so favourably commented upon by visitors and freely admitted by farmers to constitute one of their greatest assets.

Most Popular Shrubs.

As mentioned previously, the Bay of Plenty is not noted for its stereotyped methods of providing shelter and shade on the farm, but is rather the antithesis of this. Accordingly, it is almost impossible to indicate which of the many suitable trees and shrubs available for use on the farm is most popular.

One is, however, on perfectly safe ground when stating that the following species of plants are among the most favoured for general purposes: Hawthorn, barberry (common variety principally, but the seedless barberry is also used to some extent), African boxthorn in localities close to the sea-coast, escallonia species, abelia, eleagnus, *Lawsoniana*, macrocarpa, *Benthamii*, pines (mostly insignus), and eucalypts of various kinds, but mainly the species *Macarthuri*, *Saligna*, *Eugenioides*, and *Botryoides*.

For shade purposes only, the weeping-willow, poplar, and cabbage-tree are highly regarded where suitable conditions exist for their normal development. In other conditions many of the eucalypts mentioned, especially the species *Macarthuri*, *Botryoides*, and *Saligna*, grown either as single specimens or well distant in plantations, afford splendid shade to stock during the summer months. Their value was brought home forcibly to many farmers during the recent outbreak of facial eczema in different parts of the country.

Utility and Beauty.

Apart, however, from their primary importance as shelter and shade plants, many of the tree varieties listed have a utilitarian significance that is being more and more appreciated as time goes on, especially as the use of native timber-trees, because of their increasing scarcity near centres of habitation, is becoming more of a luxury with each succeeding year.

Thus, for fencing-posts, rails, &c., macrocarpa, and the eucalypt species *Macarthuri*, *Viminalis*, *Eugenioides*, and *Gunnii*, are hard to equal among the exotic trees of the Dominion for rapidity of growth, hardiness when once established, durability in the ground, and ease of splitting. They are truly dual-purpose trees, meriting adequate representation on every farm that can offer them suitable conditions for proper growth.

More Common Errors.

Although it is not within the scope of this article to deal exhaustively with the cultural practices associated with the successful establishment and subsequent treatment of the numerous plants referred

to, the main purpose being to draw attention to the possibilities of farm shelter and shade, it is at least necessary to mention a few of the more common errors that are made from time to time in order that farmers at present contemplating the provision of shelter and shade on their farms may not so easily fall into those pitfalls that are always open to the unwary.

In this connection, probably the chief error committed is the wrong selection of plants for the conditions under which they are expected to thrive or the purpose for which they are intended. This position largely results from too little knowledge of the individual requirements and habits of the numerous plants available for selection, and therefore before a wise choice can possibly be made such essential factors as soil fertility, texture and water-holding capacity of the soil, elevation, climate, proximity to sea-coast and salt-laden winds, &c., must all be fully taken into consideration.

Wasted Planting.

For instance, it is useless planting that popular tree *Cupressus Lawsoniana* in wet situations, which tend to water-logged soil conditions, as the plant will merely die of "wet feet." Nor is it any better to expect it to thrive in a poor, dry soil in a locality with a high mean temperature. On the other hand, given a cold winter climate, a generous rainfall, and a moderately fertile and well drained free-working soil, the *Lawsoniana* will grow to perfection.

Farmers need not be unduly perturbed because of the inability of their farms to grow the *Lawsoniana*, however, because there are at least two other trees with somewhat similar growth characteristics that are capable of showing a considerable degree of tolerance to the very conditions that preclude the use of *Lawsonianas*. These trees are *Cupressus Benthamii* and *Cupressus macrocarpa*—the former for wet situations, and the latter for dry conditions if carefully attended to for the first few years after planting.

Again, where heavily salt-laden breezes are experienced in localities near the coast the African boxthorn is a better plant to grow for dense, low shelter than, say, barberry, which does much better farther inland. Farmers will realize from the few examples quoted how easy it is for them to be led astray in their choice of hedge-plants and consequently the necessity for making at least an elementary study of plant requirements and habits of growth.

Desire for Quick Results.

Another very common fault frequently encountered is that resulting from a natural desire for quick results. Where a permanent and easily maintained hedge is required, the often-experienced urge to plant something that grows quickly should be curbed as much as possible, for such a decision is bound to be the cause of future regrets. Much can be done, however, to speed up the growth of the more desirable tree and shrub species by careful attention at the time of planting to such elementary details as cultivation, manuring, and proper root arrangement when placing the plants in the pits or holes prepared for their reception.

Fig. 7.—Paddocks that are beautifully sunny for stock in both summer and winter greatly add to their disease resistance and productive ability.

Fig. 8.—This scene is typical of the arboreous beauty of the Bay of Plenty. The hedges on the right and in the middle distance consists of Lawsoniana. Note the shade-trees of cabbage-trees and weeping and ordinary willow.

Fig. 9.—A portion of an African boxthorn hedge, which is very popular in many parts of the Bay of Plenty near the sea-coast.

Weeds and grass must be kept well away from young establishing plants until such time as the latter are standing well above the harmful shading and nutrient-robbing influence of immediate extraneous vegetation. Proper protection from stock is also very essential to all shelter and shade plants in their early stages of growth if normal development is to be facilitated. Without this protection it is simply waste of time and money to attempt anything in the direction of shelter-plant establishment, as the result, even if partially successful, is really very inefficient and unsightly.

Planting of Cuttings.

Care should be exercised where cuttings are being employed to form a hedge to see that well ripened wood—*i.e.*, not too hard or too sappy—is selected of sufficient size to ensure that a reasonable amount of sap is stored in them to nourish the buds until the roots are formed and are able to perform their natural duty. Cuttings about 8 in. to 9 in. long with three or four strong healthy buds to each are ideal for the purpose in hand.

Before inserting the cuttings along a fence-line it is a good idea, although not absolutely necessary, to dig a strip at least the width of a spade along the whole length of the proposed hedge. This practice not only encourages rapid root-formation, but also promotes subsequent growth by the elimination of grass and weed competition. A small amount of blood and bone manure well worked into the soil beforehand frequently induces a more rapid growth once the cuttings have struck.

An incline of about 60° from the vertical position is desirable when inserting in the soil most kinds of hedge cuttings, as this practice not only conserves the relatively small supply of sap for the longest possible period, but is also, as a general rule, productive of a denser hedge. Young seedling plants such as barberry, boxthorn, eleagnus, abelia, and escallonia, &c., may also with advantage be planted in a similar manner to cuttings for the same reasons.

Care in Trimming.

Finally, a word or two regarding hedge-trimming might not be out of season, as it not infrequently happens that this important work is undertaken with little evident knowledge of what is required. A young, growing hedge should not be trimmed too severely, for this drastically checks root-formation, which, in turn, greatly retards the growth of the above-ground parts of the plant.

Tree plants, such as pines, *Lawsonianas*, macrocarpas, and *Benthamus*, &c., that are employed in hedge formation, while submitting reasonably kindly to hard trimming, should not be topped until their growth has reached the required height. Side growth can and should be carefully trimmed from time to time, thus preventing the hedge from getting too wide and at the same time encouraging the growth from each tree to form a dense breakwind.

Hedge-plants of a shrubby nature, such as barberry, boxthorn, &c., require to have their leader growths *lightly* trimmed each year from planting in order to induce the formation of lateral growths, the latter being the very foundation of a good relatively low hedge. When the required height is reached, severe top and side trimming can be undertaken with safety. In fact, at this stage the more trimming that can be done the better the hedge.

Fig. 10.—The undesirable effect produced by planting hedge-plants in situations unsuited to their development. All the trees on the right growing in a slight hollow are dead, while those on the left occupying higher and dryer ground are, so far, thriving normally.

Fig. 11.—Dairy cows grazing under conditions typical of the greater part of the Bay of Plenty. Here abounds shelter from the cold wintry winds from the south and shade from the fierce rays of the summer sun.

Fig. 12.—Included in the trees shown are white-pine, willow, puriri, cabbage-trees, and wattle.

Fig. 13.—Long shadows are cast by weather-beaten cabbage-trees. These cool, shady areas are keenly sought out by stock during the hot, dry summer period, clearly indicating that shade on the farm is equally as important as efficient shelter.

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Subterranean Clover Survey.

Canterbury and North and Central Otago.

J. P. Beggs, Fields Division, Hastings.

INTEREST in subterranean-clover growing in Canterbury and Otago has become widespread during the last two years. Propaganda has been largely responsible for bringing this clover into the limelight, though the fact that the past two seasons have been favourable for its successful growth throughout the greater part of Canterbury has been a contributing influence. In North and Central Otago, however, conditions have not been so favourable, as in 1937 a dry autumn and winter were experienced in these parts.

If subterranean clover can be grown successfully on much of the lighter poorer land in Canterbury and Otago over a period of years, it is obvious that it could play an important part in the farming of this land. There are large areas where red and white clover cannot be grown successfully for any number of years and frequent cultivation and resowing is necessitated. It is impossible to obtain successful grass growth without clover, and if subterranean clover could be used successfully in this respect to provide nitrogen for the grass its advantages over white and red clover are obvious. Being an annual which, under favourable conditions, reseeds prolifically and buries its seed, it is able to persist under harder conditions than the perennial species of clover.

Extent of Survey.

The survey covered all Canterbury as far north as Parnassus and Waiau, and North Otago, and Central Otago. The total number of farms from which details of sowings were obtained was 179. Of these, 28 are located in the region between Waimakariri and Rakaia Rivers, 23 north of the Waimakariri River, 42 in mid-Canterbury, 40 in South Canterbury, 29 in North Otago, and 17 in Central Otago. Details were obtained for one, two, or three paddocks on each of these farms.

Subterranean clover was sown on practically all soil-types varying from stony silts and sands to stiff clay loams. Though it was found growing on all these soil-types, it was not so successful on the clays. Here the plants were smaller and did not show the same vigorous growth as was obtained on the lighter, freer soils.

Fig. 1.—A fence-line photograph showing the difference brought about by the sowing of subterranean clover on shingly land. On the left the clover is producing good green feed. No clover is present on the right, and the thin sward of grass present is dried up and producing practically no feed.

Climatic Conditions.

Rainfall.—The clover was found growing well under fairly dry conditions—from an average rainfall of 20 in. upwards. The indications are that the Mount Barker may do quite well with a lower rainfall than this, though the use of the Dwalganup strain may possibly be preferable under a rainfall of about 16 in. and lower. The Dwalganup variety was found in one instance growing well under an average rainfall of 12·11 in.

Frosts.—The frost resistance of the subterranean clover was very good. Once the plant was established properly it was not injured by frosts up to 30°, but heavy frosts were injurious to the plant in the seedling stage. This emphasizes the importance of early sowing and the part that autumn rains play in the growth of the clover. If the rains are very late the liability of the young plants to frost injury will consequently be much greater.

It may also be noted here that the older plants appear to be liable to frost injury while in the flowering stage. Several instances were seen of spring-sown stands being injured in this way while flowering in the late autumn and early winter. Many plants were killed completely and reseeding prevented.

Cultivation.

The method and extent of cultivation naturally varied from farm to farm, but it was found that in most cases a satisfactory seed-bed was provided. Rolling before sowing was practised in the majority of cases, though quite often drilling or broadcasting of the seed was carried out on a harrowed surface. Lack of consolidation appeared to be largely responsible for poor strikes in some instances.

Seed Mixtures.

Seed mixtures varied widely. In many cases subterranean clover was sown alone at the rate of 2 lb. to 8 lb. per acre, with

or without a covering crop of oats. In most instances, however, the clover has been included in a mixture at the rate of from 1 lb. to 6 lb. per acre. The most common seedings have been 2 lb. or 3 lb. per acre. The other species of the mixture are predominantly rye-grass and red clover.

Such low seedings as 1 lb. to 2 lb. cannot be recommended for general use in Canterbury. The aim should be to get a quick establishment, and for this purpose it would appear that 3 lb. or 4 lb. (preferably the latter) would be a satisfactory seeding. A higher rate than this will give a quicker establishment and less nursing will be required. In one instance where the clover was sown at the rate of 8 lb. per acre the stand got practically no spell for reseeding in the first year, being grazed with sheep throughout the flowering stage. The following year quite a satisfactory cover was obtained. Such a heavy seeding, however, is too high for general use, and the possibility of a poor strike due to a dry season must not be overlooked.

Time of Sowing.

The majority of sowings took place in the autumn (February, March, April), though there were also many late spring sowings (October and November). Further, summer sowings were uncommon—*e.g.*, in December and January—with turnips.

Spring sowing cannot be recommended, and should be avoided. The best time for the establishment of subterranean clover is the late summer and autumn.

Some very satisfactory establishments have been obtained from December seedings. Further, some late November sowings in 1936 proved satisfactory, but sowing as early as this could not be generally recommended, as reseeding is liable to occur in the autumn or early winter. December (preferably late in the month) and January sowings would appear quite satisfactory in districts where rainfall was suitable at this time.

In certain districts, such as the Lake Tekapo region and the foothills, this time of sowing is definitely necessary, as cold conditions set in much sooner. Autumn sowing is suitable throughout the great part of Canterbury and North Otago, except for the more elevated regions, which are discussed separately.

By autumn is meant February, March, and April, but it would be preferable to have the seed in before April, where possible. Best results are obtained when the clover has obtained a good start before the winter. Under these conditions growth will be maintained right through the winter if the season is not too cold, and in the early spring the plants will begin to grow rapidly.

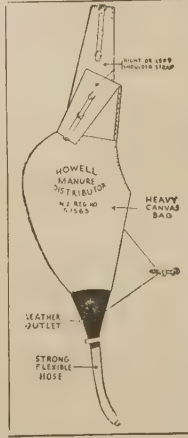
Fig. 2.—A close-up of Fig. 1 showing the Mount Barker strain growing vigorously on the stony land. The growth of rye-grass is not very dense.

Method of Sowing.

The actual methods of sowing the clover varied very widely. In a great majority of cases it was included in a grass-seed mixture, with or without a crop, such as oats, turnips, rape. In eight instances it was sown alone with a covering-crop of oats. Surface sowing on pasture has been tried in isolated cases. One farmer obtained satisfactory results from drilling 2 lb. to 3 lb. of the clover into old brown-top pastures.

For this purpose special sharp-nosed coulters were used, and the seed was drilled in with super. It was found that the clover struck well and was gradually spreading through the brown-top, becoming more prominent each year. Though it is apparent that subterranean clover could be established more cheaply in this way, it would probably be much more satisfactory to plough and resow, as a much faster establishment would result.

In forty-six instances the clover was sown in a straight grass-seed mixture without any covering-crop. Many farmers, however, found it more convenient and less expensive to sow down their grass with a crop, the subterranean clover being included in the grass-seed mixture. Of the areas visited, 88, or approximately half, were sown in this way, 24 being laid down with rape, 20 with turnips, 43 with oats, and 1 with lupins. Drilling-in of the subterranean clover occurred more frequently than broadcasting—viz., 95 areas were drilled and 70 broadcast. Different amounts of manure were sown with the seed, but the most common practice was to sow with



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1 cwt. or one bag of superphosphate per acre. A mixture of equal parts superphosphate and lime was also frequently used.

Depth of Seeding.

Regarding drilling and broadcasting of subterranean clover, it would appear that either of these methods is satisfactory, provided they are carried out correctly. In general, results have been better where broadcasting has been practised, this being probably due mainly to drilling in too deeply in many instances where drilling was carried out. Further, if a heavy seeding of grass is drilled in with the subterranean clover the strong growth of the former is inclined to hold back the clover growth.

It may be stated that broadcasting of both the grass and subterranean-clover seed has given best results, in that strikes have been somewhat more consistent and a better cover has resulted. However, in some districts it appears that drilling gives a more reliable strike, due to liability of these parts to dry spells in the autumn. This method will give good results provided the seed is not drilled in too deeply. Good consolidation of the soil is an aid in preventing deep drilling. A factor in favour of drilling is sowing of the manure in contact with the seed—this giving the young plants a better start.

Results from drilling subterranean clover alone with oats have, in general, proved somewhat unsatisfactory, and in many cases very poor strikes have resulted, due probably to drilling too deeply. Strikes have generally been better when the clover has been broadcast and the oats drilled. It would appear that the addition of a seeding of grass is preferable to sowing the subterranean clover alone.

Fig. 3.—A very dense growth of subterranean clover after one reseeding. The initial seeding was 3 lb. per acre. The excellent cover obtained in the second year from a relatively low seeding shows the value of careful treatment and spelling in the first year.

Weight of Seeding.

It might be noted here that a too heavy seeding of grass (especially Italian ryegrass) is liable to have a smothering effect on the clover in the early stages. More especially will this be so if the clover is drilled in with the grass, as a dense mat will be formed along the drills. A light seeding of grass, however, is beneficial both in providing shelter for the clover and also in giving a better pasture association. A bushel of perennial rye-grass and a few pounds of red clover would be suitable. A few pounds of cocksfoot could be added. This grass is sown by some farmers because it is less liable to attack from grass-grub. Subterranean clover has been found growing quite well in conjunction with cocksfoot. However, rye-grass is the grass of chief importance, and it is preferable to sow certified seed.

Many farmers object to the unpalatability of this rye-grass, but in general those who have been induced to sow it have obtained very satisfactory results. The trouble with palatability appears to be worst in the first year, but the trouble is reduced by keeping the grass well grazed and not allowing it to become too rank in growth.

The unpalatability also appears to be largely bound up with a poor association of clovers. Subterranean clover will probably be a big help in overcoming this problem. Montgomery red clover has been sown by a number of farmers in the last few years, and subterranean clover has been seen growing very well with this species. The Montgomery red clover produces feed further into the summer than does the subterranean clover.

When grass is not sown with the subterranean clover the ground is much more liable to loosening by "frost lift." Further, it is an advantage to sow the grass even though it may run out after about two years. It provides valuable grazing in the meantime and acts as a shelter for the clover in the early stages.

(To be continued.)

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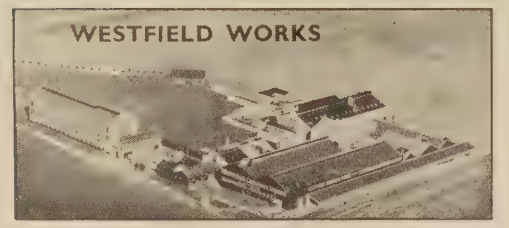

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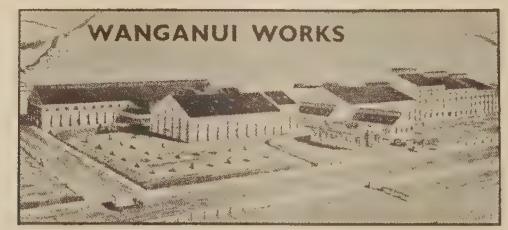

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Vital Factors in Crop-costing.

R. P. Connell, Land Utilization Officer.

THERE is an old Scottish saying, "He who counts the cost will never yoke the plough," which, according to Jas. Wyllie, B.Sc., "no doubt had its origin in the general inability to count the cost correctly." The saying and the comment on it are particularly interesting in that they reflect a position which quite often obtains in New Zealand farming—decisions not to grow crops or to grow crops being made without counting the cost correctly.

The difficulty inherent in the position is due to the fact that formal costing on a purely book-keeping basis without a close first-hand knowledge of the particular farming business to which the findings relate may readily lead to unreliable results. In short, reliable crop-costing calls not for the knowledge of an accountant or for that of a farmer, but for the knowledge available from the joint services of an accountant and of a farmer. This may be illustrated by brief mention of some basic phases of costing.

A most important phase of the position lies in the fact that items in farm costs fall into two distinct groups. One group consists of costs which do not vary directly with the volume of production undertaken; the other group consists of costs which vary with each increase or decrease in cropping endeavour. If the distinction between these two groups of costs is not taken into account, then costing computations may yield information of an academic nature rather than information of practical value, and indeed such information may be quite misleading in its application to farming. Hence, the two groups of costs warrant further consideration.

Division of Groups.

The following simple facts will enable the two groups of costs just mentioned to be differentiated clearly.

In farming, as in most businesses, there are specific costs which necessarily are incurred if the business is to be carried on, but which do not vary according to the volume of the crop produced. As instances of such costs, taxes, the cost of telephones, and the cost of maintaining drains do not vary directly in proportion to the volume of cropping. As another instance, a farmer may decide to plough up part of his pastures and grow a forage crop. He may already have sufficient labour power and equipment to do the work; hence his costs do not vary according to his additional cropping—a fact which should receive consideration.

The second group of costs consists of those which vary with each increase or decrease in cropping endeavour. Instances of such costs are provided in the outlay on seeds and fertilizers.

The distinction between the two groups of costs is a vital one. In determining the economic advisability of an additional area of crop the items of the group first discussed should not be counted fully, if they should be taken into account at all, since at least most of the return above the costs of the second group will be added to the total farm profits.

Hypothetical Case.

A legitimate charge which should be taken into account is that obtained in answer to the question: "What would have been the return from the land, labour, and equipment available if the additional area of crop had not been grown?"

The following concrete illustration of the whole position is submitted: A farmer may be considering whether he should grow 15 acres or 30 acres of swedes. His decision will not affect his taxes or his rent or interest on land. As a rule, it will not affect such costs as telephone, drainage, equipment, or power. It will not affect his labour-cost if the regularly employed farm labour does the work, but it will affect labour-costs if additional labour has to be employed. A matter calling for close attention is what would have been the return from the land involved if the additional area of swedes were not grown.

The matter of vital importance is to have proper consideration of those farm costs which do not vary with increase or decrease in the cropping endeavour. It is of moment, having due regard to the foregoing statements, that the practice of not charging such costs against an additional cropping endeavour could readily be carried to undesirable extremes in that it would lead to the costs of a particular enterprise being placed at an unduly low figure.

What is or is not an "undesirable extreme" does not admit readily of description and is considered largely a matter of good judgment.

"Joint" Costs.

Another matter of importance—indeed, a crucial problem in farm costing—is that sometimes two or more enterprises have a "joint" cost. A most important instance of this is the fact that forage crops and new permanent pastures usually to a substantial extent are produced at a joint cost, and it is difficult to decide how much of the total cost is assignable to each.

In illustration of this, when a new pasture follows an annual forage crop the question arises how to apportion manurial costs and likewise how to apportion the cost of cultivation which benefits both the forage crop and the new pasture. No hard-and-fast rules about the assigning of joint costs can be made. What would be done in this respect should vary with the circumstances on different farms and on the one farm at different times. The primary objective should be taken into consideration. In one case the primary objective of cultivation might be the replacement of an inferior sward, while in another case it might be the production of an annual forage crop.

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Market Values and Farm Costs.

A matter of occasional importance is that sometimes costing should take into consideration the higher of two assessments of the same item. For instance, if peas which cost 4s. a bushel to produce can be sold at 5s. a bushel on the farm, then the cost of baconer-production usually should be assessed not on the basis of what the peas cost to produce on the farm, but on the basis of what they can be sold on the farm.

In a somewhat similar way, a farmer may have a chance to earn £1 a day for his labour. This should be the basis of costing any farm activity that would prevent his availing himself of the opportunity of earning £1 a day. However, such a line of action in costing can reasonably be carried only a very limited distance. To illustrate the danger attaching to carrying it too far it need be merely pointed out that if all farmers growing peas for pigs were alternatively to offer the peas for sale, then the price of peas immediately would be in danger of falling.

Average Costs.

From the views put forward in the foregoing statements it follows that to individual farmers what are called "average" costs may readily be highly misleading—in fact, are likely to be so unless such average costs relate to neighbouring farms of the same class in respect to such items as size, soil-type, equipment, and supply of labour.

Purpose of Crop-costing.

It seems sometimes that there is a confusion of ideas about the purpose of costing. Assistance in avoiding this confusion could be obtained by bearing in mind that the final measure of success is the total farm profits. From this it follows that the profits or losses from different systems of cropping rather than the profits or losses from an individual crop should be the measure of the economic advisability of a cropping programme.

For instance, the economic worth of root crops on a dominantly grass-farm cannot be determined without considering their bearing on the returns from the pastures. From this it follows that what may be called "fragmentary costing" (by which is meant the costing of one article on a farm where several are produced) is but seldom satisfactory and, of greater importance still, readily may be misleading.

It does not follow from all this, however, that the costing of individual crops is useless. This becomes clear if it is borne in mind that a most important purpose of crop-costing is to enable the farmer to determine the "make-up" of the cost of any product with a view to concentrating on economies which offer themselves after due attention is paid to costs and profits per unit of produce and also to total farm profits.

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Which is the Best Baconer Carcass?

M. J. SCOTT, Superintendent of the Pig Industry, Wellington.

ONE of the questions which is always being asked by producers is "Which breed of pig is recommended for the production of bacon carcasses?" No one is in a position to give a definite answer to such an involved question, and it is usually answered by saying that there are strains within every breed that produce equally excellent baconers.

In general, there is a feeling at the back of everyone's mind that the Large White must be one parent of the ideal baconer, but it is associated with an equally real doubt whether the Large White is as hardy as the Tamworth or Berkshire, and whether it will stand up to the conditions under which the latter two thrive satisfactorily. A lesser doubt whether the Large White will be ready to send away as a light porker also complicates the issue.

Nothing Definite for a Decision.

None of these points of view is sufficiently definite to allow any one to decide on one breed or the other. While the Large White is undoubtedly the true baconer, there are strains of every other breed that produce an equally good carcass. Although the Large White in general did not stand up to our system of pig-keeping during the last ten years, there are strains of that breed which are achieving that object, and our past experience was just the unfortunate consequence of getting the wrong strains. The Large White is usually unfinished at porker weights, but there are strains that make good 60 lb. carcasses.

A decision on the question seems, therefore, not to depend on any single quality or attribute of the breeds, but on the attitude of the producer. The question seems to be whether it is best to use improved white pigs, which demand better attention and housing, or to use coloured pigs, which require improving but which can be profitably raised under existing conditions.

Best Venture.

From a long-range point of view the first is by far the best venture, provided it is not rushed. It calls for immediate attention to housing and probably a change of management policy, and makes heavy demands on the few white pigs in the country. It also involves relatively big possibilities of multiplying these too rapidly, thus using poor strains and repeating the experience of the last ten years with white pigs. The second possibility is more likely to happen.

Tamworth and Berkshire pigs thrive satisfactorily under present conditions—they turn out a good porker, they are widely distributed, and the existence of numerous good strains of both breeds would make possible the rapid distribution of quality pigs and avoid the necessity of using unsuitable ones.

Table 1.

Breed.	Number of Pigs.	Grading, per Cent.		
		No. 1.	No. 2.	No. 3.
Tamworth and Tamworth cross	66	60	40	0
Large White and Large White and crosses ..	53	49	45	6
Mixed breeds	19	26	69	5
Average, pure breeds and crosses	138	49	49	2
Average, commercial pigs same weights ..	3,000	34	48	19

Collection of Information.

If these principles are acceptable the collection of information on the relative merits of different breeds would seem, on first thoughts, valueless for the purpose of deciding which breed should be selected. There are, however, a number of details on which information is required. These are: (1) The relative carcass values (grade) of purebred pigs and commercial pigs; (2) the relative carcass values of any breed marketed in different weight ranges, and (3) whether there is any purebred outstanding from the point of view of carcass-quality.

During the last year a start was made by departmental officers to find an answer to these questions. Approximately six hundred pigs of a definite breed were tattooed or marked alive and graded after slaughter. Messrs. H. R. Denize and J. B. Speedy, in Palmerston North, with the assistance of the Kiwi Bacon Co., examined about one hundred and fifty pigs in this way, with the results shown in Table 1.

The numbers are not sufficient for any judgment to be based on them, but the results are sufficiently striking to warrant further exploration.

Messrs. H. M. Peirson and C. E. Ballinger, of the Department of Agriculture, with the assistance of Mr. A. Longwill, of the Pukekohe District Council, and through the courtesy of the Auckland Farmers' Freezing Co. at Southdown and Messrs. W. and R. Fletcher at Westfield, tattooed a further 500 pigs alive and graded these after slaughter, with the results shown in Table 2.

Table 2.

Breed.	Number of Pigs.	Grading, per Cent.		
		No. 1.	No. 2.	No. 3.
Tamworth	111	57	36	7
Tamworth × Berkshire	198	44	39	17
Large White and Large White cross	64	61	30	9
Large Black and Large Black cross	28	46	39	14
Berkshire	14	50	21	29
Average, purebreds and crosses	415	50	36	14
Average, commercial pigs same weights ..	3,000	50	34	16

Again the numbers are insufficient, but the differences are striking! Because of the small number of pigs examined it is impossible to break them up into the different weight-ranges.

Identification of Baconer Carcasses.

When this work was first considered the chief difficulty which arose was that of being able to identify the scraped and singed carcass at the grading scales. Since many pigs are now ear-marked prior to slaughter for the purpose of owner-identity it was thought that ear-marking would not be satisfactory. It had the further disadvantage that the grader would have to look for the marks, a process which requires time and a certain amount of familiarity with them.

A tattoo-mark, on the other hand, does not interfere with existing marks and may be so placed that it can be seen without being looked for. This happens if it is placed in such a position on the pig that it is about level with the grader's eye as the pig passes along the rail. After some initial failures a tattoo set of hollow needles was found to be satisfactory.

It it meets with the approval of those interested in the industry this work will be continued. Thousands of pigs could be tattooed and graded during the coming year. Reliable inferences could be drawn from such large numbers so examined, and it should be possible to discover which breeds or strains within breeds supply the ideal bacon carcass.

The Pig-club Movement.

PIG-PRODUCERS throughout the Dominion arrived at an almost unique decision last year when they agreed to levy themselves to the extent of 2d. per pig for the purpose of assisting the industry. Usually an Act of Parliament or the existence of some regulation is necessary before such levy is imposed, but in answer to inquiries instituted by the Pig-breeders' Association and the recording clubs there was a unanimous agreement that the levy should be collected. Admittedly not all the branches of the Farmers' Union replied, but almost without exception those who replied were in favour of the levy, and the "no-replies" combined with objections did not constitute more than 15 per cent. of all the branches.

Administration of the Fund.

The Minister of Agriculture acted very promptly in obtaining the approval of Cabinet for the imposition of the fee of 2d. per carcass on all pigs slaughtered, with the result that it was necessary to establish immediately some organization for the control and utilization of the funds that were beginning to accumulate. After consultations with those interested the Director-General of Agriculture decided that the fullest opportunity of controlling the funds must be given to those who provided them—namely, the producers.

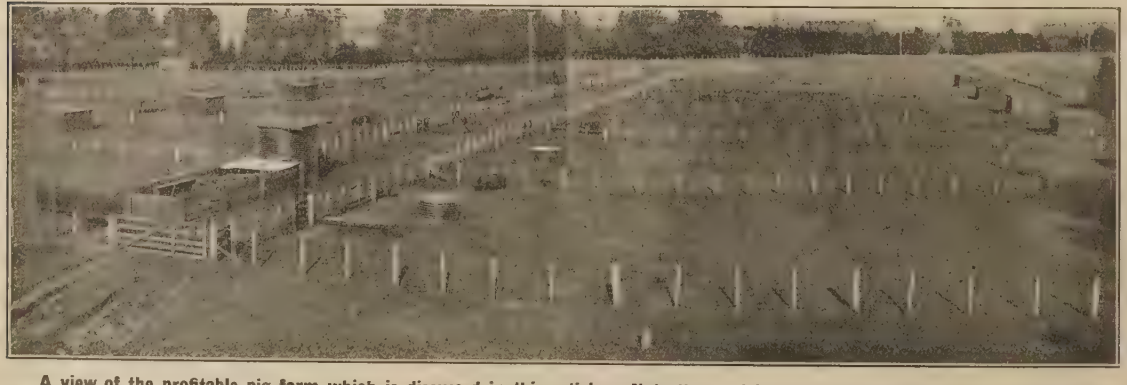
Consequently, the present organization of a National Council, working through District Pig Councils, through pig clubs, was decided on. Pig clubs had been in operation in Taranaki for a number of years, and had given good service there.

The ideal behind the Director-General's decision was that real progress in any industry is seldom achieved in the absence of initiative and enthusiasm on the part of the individuals in that industry, and while research and instruction are often the means of achieving that interest there are numerous other ways of doing the same thing. Advice which is asked for is infinitely better than advice which is proffered.

Pig clubs, while they provide many material advantages by way of distributing improved stock, are also places where farmers assemble with a common objective, where every-day problems can be discussed, and where ideas can be enlarged on and put into workable shape. This may sound commonplace and may disappoint many who are just waiting for that piece of advice or research that lies around the next corner, but on reflection most will agree that attention to the commonplace is the one item that will make the industry prosper.

Attention to Commonplace.

Put up better accommodation so that the chance of earning profits becomes as good for pigs as it is for cows or sheep. Keep them clean and well fed, in order



A view of the profitable pig farm which is discussed in this article. Note the model lay-out and housing. The pigs pay him handsomely for his trouble, and they are attracting greater attention than his dairy herd. His rejects at the works are less than one pig in one hundred.

to eliminate disease, deaths, and wastage. Use the feed available until the pig population is double; be proud of pigs, as you are of sheep and cattle, and they will pay for all the improvements—and more. Thinking about them is the beginning of progress.

The accompanying picture opposite tells just such a story. This lay-out is on the farm of a man who did not use his whey eight years ago; to-day his pigs are a major farm project. His rejects at the works are less than one pig in one hundred. More people come to see his pigs in a month than ever came to see his dairy herd in a year. He takes a pride in them, and they pay handsomely, even though he employs labour to look after them.

The Organization.

There are eight District Councils set up in New Zealand, and, so far, approximately 250 pig clubs have been established. Each District Council is an independent body receiving a grant from the National Council and employing a Supervisor and Secretary to carry out the wishes of the Council. Except for the general direction of policy and co-ordination of the efforts of all the District Councils, the Department does not appear in the picture as far as District Councils are concerned.

The Supervisor is the servant of those who pay the levy, and if any one feels that he is not receiving his share of service from the organization he can address himself to the District Council in his area, or join a pig club, become a member of the District Council, and take his chance of being elected to the executive, which controls the policy of the Council. If the movement fails producers will only have themselves to blame; if it succeeds they will reap the benefit.

The locations and officers of District Councils are as follow:—

Council.	Supervisor.	Secretary.	Address.
Northland ..	Beattie, W. A. ..	Butler, C. P.	P.O. Box 131, Whangarei.
Auckland ..	Longwill, A. ..	Basham, G. R.	P.O. Box 32, Pukekohe.
Waikato ..	Harrington, C. P. ..	Vallilley M. J. (Miss) ..	Wesley Chambers, Hamilton.
Taranaki ..	Sorensen, C. H. ..	Morgan, D. le C. ..	P.O. Box 131, New Plymouth.
Bay of Plenty ..	Beattie, D. G. ..	Kent, G.	P.O. Box 12, Whakatane.
Wellington ..	Neilsen, E. P. ..	Plimmer, L. I. ..	P.O. Box 80, Palmerston North.
Christchurch ..	McIntosh, H. ..	Lyttle, A. E. G. ..	P.O. Box 639, Christchurch.
Otago and Southland	McDonald, N. ..	Calder, E. H.	P.O. Box 693, Dunedin.

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Influence of Salt on the Flavour of Butter.

G. M. Valentine, Assistant Director, Dairy Division.

THE last paragraph in the article on this subject, published in the February issue of the *Journal*, stated that arrangements had been completed for the manufacture of an experimental line of butter, which would be reported on at a later date by the London officers of the Department. For this purpose three churnings were made under creamery conditions on three successive days from the 7th to the 9th of December, 1937, and a report on this butter has now come to hand.

The method of manufacture was that followed in the creamery at which the butter was made, which was briefly as follows :—

All cream was pasteurized in a Berry twin pasteurizer, and the cream for all three churnings on each day of the experiment was taken from the same vat. The churning temperature of the cream was 46° F., 48° F., and 50° F. on the three successive days. The acidity of the cream at churning was 0·12 per cent., 0·13 per cent., and 0·14 per cent. The butter when churned was the size of small marbles. The temperature of the wash-water was 38° F. to 39° F. The butter was worked for three revolutions on low gear before salting. The salt was saturated with water before being added to the butter.

Salt and Moisture Content.

The salt and moisture content of each churning was as follows :—

Churning	1/7.	2/7.	3/7.	1/8.	2/8.	3/8.	1/9.	2/9.	3/9.
Salt.									
At creamery ..	1·50	1·45	1·6	1·8	1·5	1·45	1·6	1·4	1·55
At grading-stores ..	1·35	1·45	1·5	1·5	1·5	1·30	1·5	1·4	1·50
Water.									
At creamery ..	15·9	15·7	15·7	15·0	15·7	15·7	15·4	15·8	15·4
At grading-stores ..	15·5	15·7	15·5	15·0	15·6	15·4	15·4	15·9	15·5

The salt used was stoved vacuum, unstoved vacuum, and fine dairy, but the same salt was not always added to the churning bearing the same number. Practically no difference in the salt content of any individual churning could be detected by the senses at grading, and all churnings scored 94 points.

It will be noted that the churning practice was practically similar to that described under (*d*) on page 100 in the February issue of the *Journal*, with the addition of a short working-period before the salt was added to the churn, and two points should be kept in mind in this connection.

It is more difficult to get an even distribution of salt over the surface of the butter when it is in a wet condition. The short working-period, given with the object of getting rid of as much surplus water as possible, reduces the surface area over which the salt can be spread, through the aggregation of the butter granules into large lumps. Consequently, it is not mixed so evenly through the butter, and its distribution will depend entirely on the working.

This probably accounts for the somewhat irregular salt and moisture content of the butter as indicated by the difference between the results obtained at the creamery and the grading-stores. It is also a possible explanation of the remarks on salty flavour in the London reports.

Butter Examined in London.

The butter was examined in London on 3rd March, making it approximately three months old. Its general quality is described as follows :—

> All churnings examined were of good quality and showing very pleasing salt characteristics. The variation between any of the churnings was slight and of no commercial significance.

There are, however, a few points of interest, the most significant being that No. 3 churning with a salt content of the same order as the others was preferred to them on every occasion. The general remark regarding it was that the salt and acid was nicely balanced. The salt used in each of the No. 3 churnings was fine dairy.

No distinction regarding salting was made between churnings No. 1 and 2, in which stoved and unstoved vacuum salt was used, but a difference was noted between the salting of these churnings from day to day. Those churned on the 7th, when the temperature of the cream was 46° F., were described as "salting about right." On the 8th, with a churning temperature of 48° F., the remarks are "salt a little noticeable on the palate"; while on the 9th, when the temperature of the cream was 50° F., they are "salting noticeable but not pronounced," with a slight preference for 1/9.

The Keeping-quality.

It will be noted that in churnings No. 1 and No. 2 on the 7th, which had a low salt content and were churned at a low temperature, the salting was right. On the 9th, although the salt content was slightly lower than the 8th, the churning temperature was higher and the salting was more noticeable.

Recent reports from London express some concern regarding the keeping-quality of butter made at these comparatively high temperatures, which reduce the working-period and give a less complete distribution of the salt and moisture.

It is an accepted belief among bacteriologists that the finer the droplets of water and the more complete their diffusion through the butter the less opportunity is there for the growth of the bacteria which it contains.

There is also some support for the belief held by some chemists that a thorough mixture of the fats of which butter is composed has a direct influence on the chemical changes which take place in it during storage.

This is in line with practical experience, which has shown that well-made butter will keep better than poorly made butter manufactured from the same cream, and it would be well for the industry to make note of this suggestion.

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Citrus Pests: (2) The Citrus Borer.

W. Cottier, Entomologist, Plant Diseases Division, Plant Research Bureau.

THE citrus borer, *Aemona hirth* Fabr., is a native of New Zealand and was originally a borer in endemic trees and shrubs, but on the introduction of citrus trees it quickly made this plant one of its hosts, so that by now it is by far the commonest insect found boring in the wood of orange and lemon trees. It is present in the Dominion almost wherever this host is grown, and is particularly troublesome in old trees which, all too commonly, are in a neglected state.

Apart from damage caused directly to twigs and branches, the wounds made by this pest offer places of entrance to various kinds of fungi, and unless attention is given to damaged wood further complications are likely to develop.

Nature of Damage.

There are two main types of damage. The first is noticed about December, when the young tips of twigs about the thickness of a pencil begin to die off. If these are split and followed down a white grub will be found boring in the centre of the wood (Fig. 3). The other type of injury is that caused to the larger branches, where the presence of the grub is evident at all times of the year by the collection of sawdust-like borings which drop from the burrow. These larvæ actually bore in the living wood, working longitudinally along the branch or else around it in a twisting burrow. The result of infestation is either unthrifty growth or whole branches of dead wood (Fig. 2).

Appearance of Insect.

The adult is a relatively narrow beetle (Fig. 1) about 1 in. long. It is reddish-brown in colour, and the wing cases are clothed with a great number of light-brown hairs. The eyes are black, and the "feelers," or antennæ, are of the same colour as the body and approximately the same length. The legs are reddish-brown and relatively long. The grub, when full grown, is white or creamy, has a dark-brown head, and is about 1½ in. long (Fig. 1).

Life-history and Habits.

The following observations at Kerikeri by Mr. E. C. S. Little, describe well the known life-history of the insect:—

Fig. 1.—The adult of the citrus borer—enlarged approximately two and a half times.

[*After Miller—Photo by E. B. Levy.*

"The whitish, waxy eggs are laid in crevices and cut surfaces or on small twigs. These hatch in a few days, and the larva burrows down the centre of the twig. It is rare that more than one larva is found per system of tunnels, although more than one egg has been found laid on the same spot. The larva usually works towards the main trunk, and frequently when it reaches wood about ½ in. in diameter makes tunnels round the branch, ring-barking it, and causing it to break off soon afterwards. Apparently the larva cannot develop in dead, dry wood, but it seems to thrive in dead wood which is exposed to rain.

"The larva drives a tunnel directly down the core of the branch, but at intervals of a few inches sends side tunnels to the surface for the discharge of its borings and also presumably for ventilation, as invariably the first few inches of the system are blocked by a mass of wet borings. This plug is entirely different from the plugs formed when the insect is about to pupate.

"It seems that all the wood bored passes through the intestines of the larva and is voided in small lumps which, when dry, tend to break up into a dust. However, when about to pupate, the larva strips off long thin pieces of wood and packs them into two tight plugs about ½ in. long and about 1 in. or so apart and pupates in the space between.

The pupa is naked, and takes two to three weeks before the adult emerges from the pupal skin.

"The adult insect rests for a few days in the branch, and then emerges. According to one writer on the subject, it bores its way out through the side of the branch. The mandibles of the adult are not capable of boring, but they are powerful enough to pull the plug in the passage-way to pieces and enable the insect to crawl up the branch and escape by one of the orifices.

"The adult beetle flies by night and is attracted by light. It emits a high-pitched buzzing sound when captured, caused, I believe, by the rubbing of the posterior end of the dorsal plate of the thorax against the abdomen. The adults have been seen in numbers in December."

From the evidence available it appears that the grub may bore in the wood for a long period, possibly twelve months or more.

Host Plants.

In addition to all varieties of citrus, the insect has been reported as boring in the stem of rangiora (*Brachyglottis repanda*), tauhinu (*Cassinia leptophylla*), *Senecio rotundifolia*, and probably also attacks many other native shrubs and small trees. Mr. Little reports it as boring extensively in *Albizzia pycnantha* and also in tree tomato, tree dahlia, *Hakea saligna*, and tung-oil trees. It is also reported to attack poplar, Chatham Island ake-ake, goat willow, almond, apple, and gooseberry.

Control.

In the control of borers the following measures are those which will be found most useful: Where young twigs are dying from borer attack they should be cut off below the point where the grub is located and then burned. With larger branches, the injection of a little petrol or carbon disulphide into the entrance of the borrow and the immediate blocking of the entrance with grafting-wax, plasticine, soap, putty, or a wooden plug, will give satisfactory results.

All wood killed by borers should be cut back to healthy tissue and the wound treated with a suitable dressing to prevent the entrance of disease. The insect should also be eliminated from alternate host plants in the vicinity of the orchard.

Acknowledgment.

I wish to acknowledge the kindness of Mr. E. C. S. Little in allowing me to use the material he has collected.

Fig. 2.—Showing the typical condition of older citrus wood severely infested by borer.

[Photo by H. Drake.

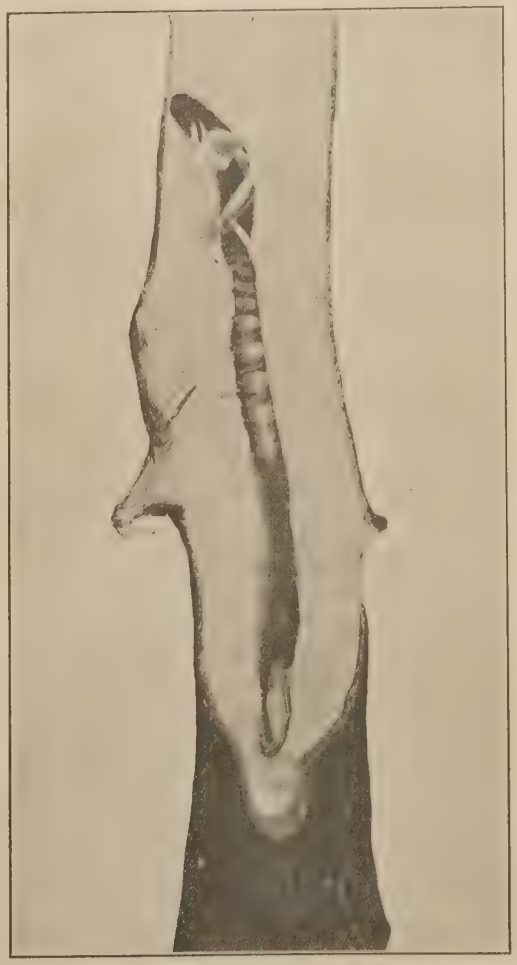

Fig. 3.—Showing larva boring in an infested branch —natural size.

[Photo by H. Drake.

Agricultural Regulations.

Subsidies to Owners of Stallions.

A. E. MORRISON, Solicitor, Department of Agriculture.

THE Remounts Subsidy Regulations 1938 have been made under the Remounts Encouragement Act, 1914, and came into force on 2nd June, 1938. The regulations prescribe the conditions subject to which subsidies may be granted to owners of stallions in respect of the services of stallions for any breeding season and the necessary machinery for the purpose of giving full effect to the Act.

The Minister of Agriculture is empowered to appoint local Remount Committees as the need arises for the purposes of the regulations. Each committee shall consist of three members, who shall hold office during the pleasure of the Minister, and shall be appointed after consultation with representatives of the Executive Committees of the Royal Agricultural Society, the New Zealand Racing Conference, the New Zealand Trotting Conference, and the New Zealand Hunts and Polo Associations.

Functions of Committee.

The functions of a committee are to select and recommend stallions for subsidy; to define the area in which a subsidized stallion may travel for the purpose of serving mares; to select and approve mares suitable for service; to settle the order in which approved mares shall be served and the routes to be travelled by a subsidized stallion; to investigate complaints in respect of any matter in relation to the serving of approved mares; and generally to do whatever in the opinion of a committee may be necessary to ensure the effective administration of the regulations with respect to a subsidized stallion for the time being under its supervision.

Application for Subsidy.

The owner of a stallion who desires to apply for a subsidy in respect of his stallion should make application on the prescribed form, copies of which are obtainable from the Director of the Live-stock Division, Department of Agriculture, Private Bag, Wellingon. The application should be forwarded in the first instance to the Director.

Arrangements will then be made for the examination of the stallion by two veterinarians for the purpose of ascertaining whether or not the stallion is free from hereditary unsoundness and from the diseases and defects set out in the regulations. Suitable arrangements will also be made for examination of the stallion by the committee appointed for the service district in which the owner proposes to travel his stallion for the purpose of ascertaining whether it is of a type whose progeny would be suitable for military purposes.

Upon receipt of the report of the committee and the result of the veterinary examination the Minister shall determine whether a subsidy should be granted in respect of the stallion, and the decision of the Minister shall be final and binding on all parties.

Settlement of Boundaries.

The committee appointed in respect of a subsidized stallion, in consultation with the owner, is required to settle the boundaries of the service district within which the stallion must travel, having regard to the maximum number of approved mares to be served in any service season, to the number of mares available in the district, and to the particulars of the service district given by the owner in his application for subsidy. In consultation with the owner the boundaries of any service district may be altered and redefined.

Approval of Mares.

The owner of any mare who desires his mare to be served by a subsidized stallion should make application on the prescribed form to the Remount Committee for the service district assigned to the stallion and in which the mare is kept or depastured. The committee or some member thereof, without requiring a mare to undergo any veterinary examination, is required to determine whether the animal is of sufficient merit to be served by the subsidized stallion, and if he is so satisfied the mare shall be placed on the list of approved mares to be served during the service season and the owner notified accordingly. Not more than sixty mares are to be approved for service in any season, exclusive of any mares which, for any reason, are not served.

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Conditions of Service by Stallion.

The conditions of service by a subsidized stallion are—

(*a*) The stallion must travel in the service district as directed by the Remount Committee appointed for the district, and the routes to be followed in the serving of mares shall be subject to the approval of the committee, but may be varied from time to time as the committee thinks fit.

(*b*) The stallion-owner must comply with the requirements of the committee in connection with the serving of mares.

(*c*) The stallion-owner, in the event of the death of his stallion or inability because of illness or accident to fulfil its service engagements, must report the matter to the Minister, accompanied by a veterinary certificate setting forth the cause of death or the nature of the disability.

(*d*) The stallion-owner may be required to offer another stallion for the purpose of carrying out the service engagements of the dead or disabled stallion.

(*e*) The stallion-owner is not required to cause his stallion to serve more than sixty approved mares in any service season.

(*f*) The stallion-owner will be supplied with a service-book, in which must be entered particulars of all mares served. The service-book remains the property of the Crown and must be surrendered on demand. In particular, the service-book must be delivered to the Minister or his Department within one month after the close of the service season.

(*g*) The stallion-owner must not sell, let, or otherwise dispose of his stallion or its services without the consent of the Minister at any time while he receives or continues to receive a subsidy.

Conditions of Service of Mares.

The conditions of service of approved mares are—

(*a*) All mares must be served at the risk in all things of the owner.

(*b*) The stallion-owner may require a mare to be hobbled before service.

(*c*) The stallion-owner may refuse to allow his stallion to serve a mare believed to be suffering from a contagious disease, but he must report his refusal to the Remount Committee of the district, and the committee's decision in regard to the matter shall be final and binding on all parties.

(*d*) A service fee not exceeding four guineas (including groom's fee) shall be payable by the owner of a mare, and such fee shall be paid on or before service. All approved mares up to sixty must be served in any service season for a fee not exceeding the amount stated whether or not subsidy is payable in respect of such service.

(*e*) The receipt for the service fee is incorporated as part of the service-book, and payment of the fee entitles the owner of a mare, for whose service the receipt is given, to a second and third service in respect of his mare if necessary during the service season.

(*f*) A mare owner who refuses to pay the service fee due for the first service may be refused further service in respect of his mare if payment of the service fee is not made or the receipt for payment of the fee cannot be produced.

(*g*) No foal fees shall be payable in respect of any service.

(*h*) On completion of any service the service-book must be signed by the owner of the subsidized stallion and by the owner of the mare or by their respective representatives.

Payment of Subsidy.

The subsidy payable to the stallion-owner shall be four guineas for each mare served, but not exceeding a maximum subsidy in any service season of £150. Except in special cases approved by the Minister, progress payments of subsidy will be made on receipt of a certificate from the Remount Committee for the district assigned to the subsidized stallion indicating that not less than ten mares have been served. The final payment of subsidy will be made after the close of the service season on delivery to the Minister or his Department of the service-book issued to the stallion-owner.

Payment of any subsidy, however, is conditional upon compliance by the stallion-owner with all the requirements imposed on him by the regulations. The Minister may withhold payment of subsidy if he has reason to believe that the stallion-owner has failed to comply with the requirements of the regulations, and according to the seriousness of such failure the Minister may—

(*a*) Refuse to make payment of the amount claimed, or

(*b*) Reduce the amount of subsidy payable, or

(*c*) Revoke his award of subsidy, such revocation to take effect on receipt by the stallion-owner of the notice of revocation.

Lodging of Complaints.

Any complaint by the owner of a subsidized stallion or by the owner of a mare with respect to any matter relating to service must be lodged with the Remount Committee for the district assigned to the stallion, and the decision of the committee on such complaint shall be final and binding on all parties.

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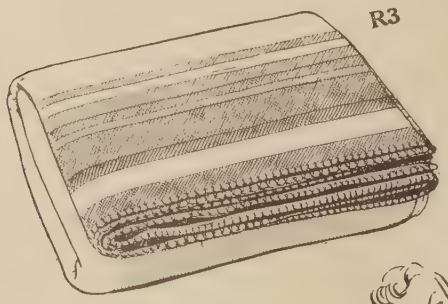

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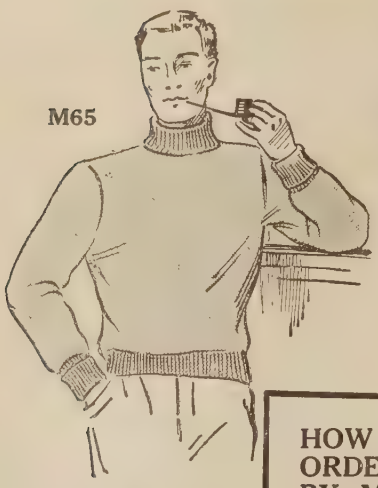

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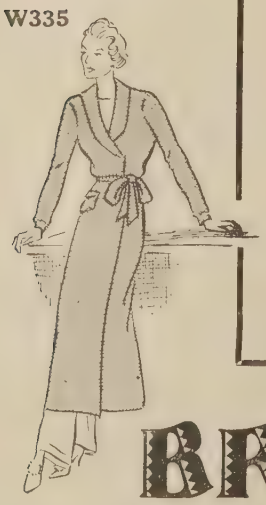

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Lotus Major in Surface-sown Pastures.

K. M. Montgomery, Instructor in Agriculture, Te Kuiti.

A LARGE number of the hill-country pastures of the North Island are those which were sown after a bush burn. Unfortunately, in many instances in the choosing of seed for the burn mixture sufficient thought was not given to the selection of grass and clover species which would take the place of the high-fertility demanders—rye-grass, cocksfoot, white clover—when the ash fertility fell below the point where it could amply provide for them.

Where the original mixture consisted mainly of Italian and perennial rye-grass, cocksfoot, and white clover it was not many years before the sward opened up and weeds and bracken fern invaded the pasture (see Fig. 1—open danthonia-brown-top sward, no legumes, flat weed, and bracken fern establishing). Carrying-capacity dropped rapidly, and it was not long before the area was covered with fern and even secondary forest growth. Lack of fencing and top-dressing were also factors which had considerable bearing on the rapid deterioration of the hill country.

Maintenance of Pasture.

On the other hand, where legumes, particularly *Lotus major*, which would thrive under poorer conditions, have been included in the bush-burn mixture or have been since introduced into the sward the pasture still remains quite capable of reasonable stocking. *Lotus major* is admirably suited to hill-country pastures in the high-rainfall belt. It will persist under a wide range of soil conditions and will be found growing luxuriantly in drained and semi-drained swamps, on clay banks, and even on dry, hard knolls. It will stand competition from tall-growing bracken fern, and during the flowering season its bright yellow-coloured flower can be seen above the fern growth.

Under close-grazing *Lotus major* will with some of the grasses—*e.g.*, *danthonia pilosa*—form a good combination sward, and even without extensive top-dressing is capable of maintaining quite reasonable stocking. An instance of this is the case of a hill-country farmer in the Ongarue district on a steep 399-acre farm—all grass, no cropping—who winters six hundred breeding-ewes, forty breeding-cows, twenty yearlings, and thirty 2½-year-old to 4-year-old bullocks.

The lambing percentage averages 115 per cent., and 99 per cent. of the lambs are sent off as "fats" from the mothers. Cull ewe lambs are bought in for flock replacements. Since the bush burn was sown twenty-four years ago some 2 lb. per acre of *Lotus major* seed has been oversown, and this is well distributed throughout the pasture (see Fig. 2). Doubtless it is due to this practice that the carrying-capacity has been maintained.

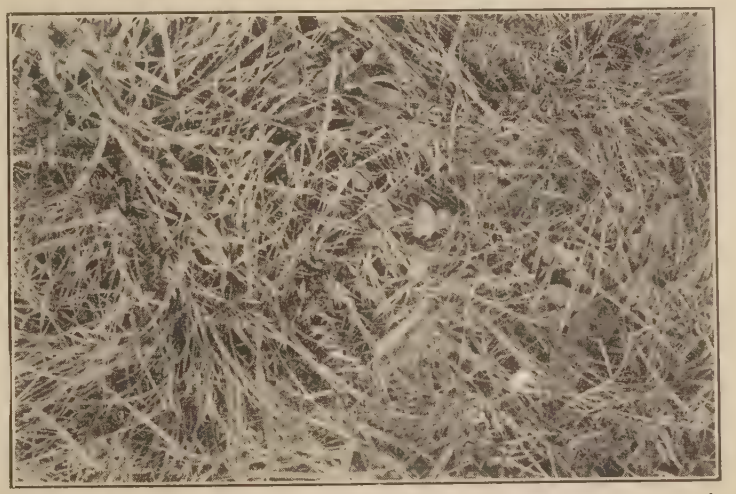

Fig. 1.—Here is a sward of brown-top, danthonia, flat weeds, and bracken fern. Note the absence of clover.

[H. Drake, photo.

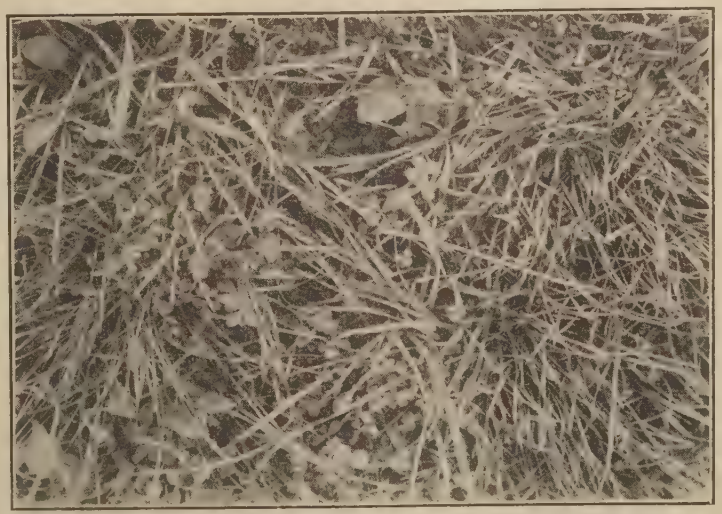

Fig. 2.—A dense danthonia-Lotus major sward. The picture was taken twelve days after sheep had been removed from the field.

[H. Drake, photo.

Top-dressing.

In this instance the farmer has tried top-dressing, and has checked up his results with carrying-capacity trials. He found that the top-dressed areas did not carry any more stock than the untop-dressed areas, but he considers that a little top-dressing is required to keep the *Lotus major* thriving. Probably if top-dressing is to show the best possible returns on the type of pasture instanced (danthonia-*Lotus major*) it would have to be oversown with higher stock-carrying-capacity plants such as perennial rye-grass, cocksfoot, white and subterranean clovers.

Possibly the quickest and cheapest method of distributing *Lotus major* throughout some hill-country pastures is to turn cattle on to a fern block while the *Lotus* seed is still in the pod. The cattle move about the country and the seed is spread over the pasture in the droppings. *Lotus* can also be introduced into the sward by including some seed in the fertilizer during top-dressing operations, or sowing by hand a few seeds in open spaces, on clay banks, &c., after breaking the soil with the foot to give cover to the seed. *Lotus major* is slow to establish, and generally it is two to three years before it becomes very pronounced in the pasture.

Mr. E. Bruce Levy, in his bulletin "The Grasslands of New Zealand, Series 1: The Principles of Pasture Establishment" mentions *Lotus major* as being particularly suitable as a pioneer plant on peat swamps, river-flood areas, pakihi lands, and bush burns, especially in the higher rainfall areas and consolidated sands, and as a general legume of permanent pastures of the lower fertility areas of the North Island.

Vigorous Growth of Strawberry Clover.

TWO instances of strawberry clover doing well have been noticed in the North Auckland district. On a portion of the Ruawai flats which had been flooded several times last winter by tidal waters from the river (a flood-gate had given way) this clover was present in a fair amount and was growing vigorously, producing a good bite of green feed during the dry spell being experienced. Near Kaukapakapa, on the edge of the Kaipara Harbour, strawberry clover is to be found growing vigorously on the edges of the seashore. On hillsides which during westerly weather receive a fair amount of salt spray the clover is firmly established and thriving.

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Northern Wairoa Demonstration Farm.

E. B. Glanville, Instructor in Agriculture, Whangarei.

IT is now some years since notes on operations carried out at the Northern Wairoa Demonstration Farm have been prepared for publication in the *Journal of Agriculture*, and the 1936–37 season saw the completion of the twelfth year of dairying on the farm. The farm went through a very difficult time during the slump period, and with a limited amount of finance available it was impossible to carry out any large-scale experimental work, all available finance being absorbed in wages, interest, and maintenance.

In 1934, when the writer took over the chairmanship of the society, prospects looked brighter for production, and in view of this, and also in the hope that butterfat would realize a higher price, the Committee planned certain improvements on the farm. Maintenance-work during the slump was difficult to keep up, and the farm gradually got into disrepair. The Committee was faced with a considerable expenditure in providing new piggeries, a new milking-shed, renewing a large number of fences, extending the water-supply, replacing worn-out wooden drinking-troughs with concrete troughs, and providing a number of concrete troughs in paddocks not previously watered.

Fig. 1.—A portion of the new pig lay-out. Note how sow with litter has close-grazed grass in second paddock from left.

Comprehensive Programme.

The programme of permanent improvements necessary to bring the farm up to the standard expected of a demonstration

Fig. 2.—Illustration of the type of movable pig-house provided in the lay-out of the farm.

Fig. 3.—A close view of the finishing sty used for fattening pigs. The sty has a concrete floor with a close boarded, movable wooden platform overlying the concrete in the house portion.

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farm appeared in the first instance to be of gigantic proportions, but by careful planning and by doing a certain amount each year the Committee has been successful in bringing about a great change in the appearance of the farm during the three years under review.

Butterfat-production has increased considerably, and this, together with the higher prices received for dairy-produce, has greatly assisted the Committee in completing its plan of improvements, while the subsidy received each year from the Government has also been a contributing factor to the objective being reached.

Over the period the farm has been in existence a constant improvement has been taking place in the pastures. They have been converted, in some paddocks by ploughing and resowing and in others by top-dressing with basic slag or lime and super, from poor brown-top and paspalum swards into good rye-grass, white clover, and paspalum swards. The improvement which has taken place in the quality of the pastures has been clearly shown during the last three years by the great increase in butterfat-production. It is also of interest that the peak of production is now reached during October, whereas, before this improvement was brought about, the peak was not reached until as late as December.

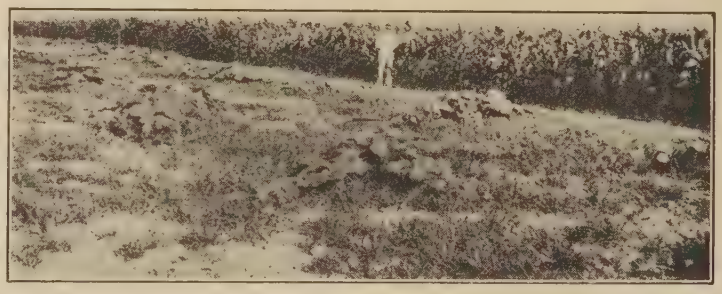

Fig. 4.—Maize and pumpkins should prove an excellent farm-grown food for wintering store pigs in North Auckland. The picture shows an excellent crop of maize and pumpkins growing on the farm. The photograph was taken eight weeks after sowing.

Herd and Butterfat-production.

During the three years under review butterfat-production has forged ahead although the herd has been increased by only a few cows each year. Butterfat-production was exceptionally low for the year ending 30th June, 1934, when only 10,648 lb. were produced, realizing the small sum of £383. For the 1934–35 season it increased to 13,429 lb., returning the sum of £510, while it decreased to 12,038 lb. in the 1935–36 season. In this season everything pointed to an increase

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over the 1934–35 season, but production dropped immediately after a very high flood experienced in February, 1936. Even with this decrease in production the returns from butterfat increased to £597 through the higher price paid for dairy-produce. A record for butterfat-production was obtained in the 1936–37 season, when it reached 17,615 lb., bringing in the sum of £1,035.

The herd has only shown a small increase in numbers during the three years. Fifty-four cows were milked during the 1934–35 season and fifty-two during the 1935–36 season, while in the 1936–37 season, when the high production was obtained, the herd was increased to sixty-three cows. In the past the cows commenced calving early in July, but it was thought desirable to bring them in a little later because of the cold, wet weather generally experienced in July and followed by a shortage of feed from pastures in August and September.

Fig. 5.—A view showing the strong rush growth on the wet, undeveloped portion of farm. Meadow foxtail, Lotus major, and paspalum are growing between the rushes.

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During the period under review calving commenced from the last week in July. Much more satisfactory results were obtained, and the same feed shortage was not experienced as when the herd came in earlier. The herd was dried off during April and May and turned on to rough feed in the undeveloped portion of the farm, where it was given supplementary feed in the form of hay. As the cows began to spring they were drafted into a handy paddock and fed a good ration of hay and ensilage on alternate days.

Looking after the herd and feeding it well in this manner during the two sty (Fig. 3) to finish off the heavy pigs. This was provided during the 1935–36 season, and has proved very valuable in saving the excessive tramping which the grass paddocks were previously receiving.

Further improvements were carried out to the lay-out during the 1936–37 season so that more pigs could be accommodated to handle the increased supply of skim-milk. The lay-out of 3 acres now consists of nine divisions, each provided with a movable house, while a fixed sty built in two compartments and capable of housing fourteen heavy pigs is also provided.

Improvement in Returns.

The adoption of modern methods of pig-keeping has led to a considerable improvement in the returns from pigs, which up to the 1936–37 season was £2 per cow. Further improvement is sought, but this can be obtained only by the provision of farm-grown feeds to supplement skim-milk. Bay of Plenty farmers make use of maize, and an area of maize is being grown on the demonstration farm this season to investigate the economics of maize growing and feeding under North Auckland conditions.

Fig. 6.—Part of the farm in 1929. Lack of shelter gave the farm a bleak appearance; stock were miserable in cold weather, and production was low.

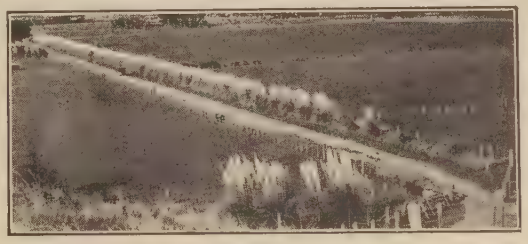

Fig. 7.—The same part of the farm in 1937. The shelter gives the farm a warm appearance, and the stock are afforded protection from cold winds, which leads to increased production.

months it is dry has proved to be very profitable. The cows come in in good condition, very little trouble is experienced at calving, and they have every chance to start off the season without suffering from setbacks. It can be confidently said that the good production now being received is due to a great extent to attention being paid to the winter feeding of the herd with adequate supplies of hay and ensilage.

Pigs and Maize.

In the past the facilities at the farm for housing and running pigs were of a very primitive nature, and the first permanent improvement undertaken by the Committee during the 1934–35 season was to provide up-to-date and adequate accommodation to rear and fatten pigs successfully. The old sties were pulled down and burnt, and were replaced by a lay-out (Fig. 1) of small grass paddocks provided with movable draught-proof houses (Fig. 2).

A 3-acre paddock was, in the first instance, divided into three equal areas. One of these areas was divided into three divisions and a movable house placed in each. The divisions consisted of approximately one-third of an acre, which is larger than is generally recommended for pig lay-outs. It was thought that with smaller divisions on a clay soil type, which becomes fairly wet during the winter, the pigs would soon tramp out the grass. Although the grass has stood up very well to the tramping by pigs it was found desirable to provide a fixed fattening

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(Sgd.) R. J. Jackson, Rangiriri. 6-6-38.

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Recent work at Ruakura has shown that store pigs gained about 0·4 lb. liveweight per day on 1½ lb. of maize and roots or on 1 lb. maize and ½ lb. meatmeal in the winter months. Maize and pumpkins should prove an excellent farm-grown food for wintering store pigs in North Auckland, and the results obtained from the work being carried out at the demonstration farm this season should provide useful information on the possibilities of successfully wintering store pigs.

Pasture Establishment.

Most of the pastures on the farm have been brought to their present state of fairly high productivity by top-dressing with basic slag or a mixture of lime and super. It has often been stated that, once broken up with the plough, the Northern Wairoa flats take several years after sowing before a satisfactory covering of grasses and clovers can be established. It is maintained by authorities on grassland that this statement is not correct if the land is treated with thorough cultivation and adequate quantities of lime and phosphate, and is sown early with certified strains of grasses and clovers.

To gain information on this point the Committee during the 1936–37 season treated a small paddock of 3 acres, and everything possible was done to obtain an early and satisfactory establishment of permanent pasture. The paddock had been cropped with turnips and maize for two years after ploughing a run-out pasture sward of paspalum and brown-top. Ploughing for permanent pasture was done during the late spring of 1936, and the land was fallowed and regularly cultivated throughout the summer.

An ideal seed-bed was prepared and the land was actually ready for sowing in January, but harrowing was continued each week, and lime at 1 ton per acre was applied at the end of January. This was harrowed in with a light harrow, and the following grass-seed mixture was sown on the 20th February, 1937, after the seed-bed had been rolled with a Cambridge roller.

	Per Acre. lb.
Certified perennial rye-grass	25
Certified Italian rye-grass ..	5
Certified Akaroa cocksfoot ..	5
Timothy	3
Certified white clover ..	3
Montgomery red clover ..	2
Titus major	½

Excellent Strike.

Superphosphate at the rate of 3 cwt. per acre was broadcast at the time of sowing, and the seed was covered with a brush harrow and rolled again with a Cambridge roller. No paspalum was included in the mixture, as it was considered that a sufficient number of plants would survive the cultivation to re-establish and ultimately provide enough of this species in the sward. This sowing gave an excellent strike of grasses and clovers. Five weeks after sowing it provided five days' grazing for 263 ewes. It was then spelled for two weeks, when the same sheep again grazed it for four days. It was then closed, and at the end of June the growth was more than 6 in. high. The pasture on this paddock established rapidly and is now carrying a tight sward of grasses and clovers.

This demonstration clearly proves that if the work of establishing pastures is done thoroughly success will result. The main cause of unsuccessful pasture establishment on the Northern Wairoa flats is failure to obtain early clover establishment. In some cases this is due to hasty cultivation, in some to poor seed, and in others to inadequate supplies of lime and

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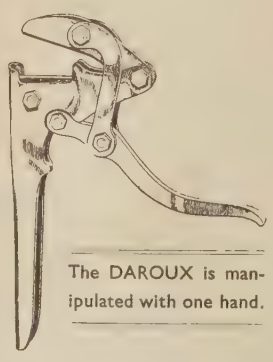

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phosphate, and in the majority of cases to late sowing on an unconsolidated seed-bed.

The success of first-class pasture establishment depends on the early establishment of white clover, and this should be the farmers' aim — plough early, cultivate thoroughly, sow early, use a liberal amount of lime with 3 cwt. of superphosphate, use certified seeds, and roll the seed-bed before and after sowing.

Development of Swamp Area.

Now that the major portion of the flat land on the farm is carrying a good sole of grasses and clovers the Committee has been contemplating the development of the low-lying area of swamp land, which consists of approximately 30 acres. This area (Fig. 5) is covered by a heavy crop of large rushes, with paspalum, meadow foxtail, and *Lotus major* growing between them. It provides a certain amount of rough feed throughout the year, but it is very low-lying and exceptionally wet. It is bounded on the bottom end by the Kaihu Stream, which is tidal, and when high tides are experienced they rise over the banks and flood the lower parts of this block of land.

The soil on this area is of high-quality alluvial clay, and when brought in it should be the highest-producing area on the farm. Much work in the way of stop-banking and drainage is required before any attempt can be made to establish permanent pastures. A scheme of stop-banking and drainage has been prepared by the Hobson County Council's engineer, and contracts are to be let this year to have this work done. The large amount of work required to complete the scheme will be costly, as, in addition to the stop-banking and drainage, two concrete flood-gates have to be erected to provide outlets for the drainage.

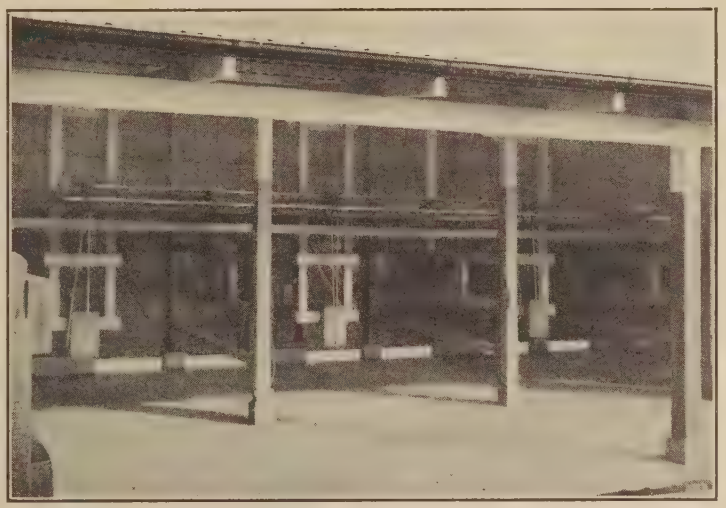

Fig. 8.—The interior of the new milking-shed built in 1936. Note the cleanliness of the shed, which assists in obtaining high-grade dairy-products.

The Committee has obtained a portion of last year's Government subsidy to pay for this work, and it is intended to let the contracts under the 4B scheme. If this assistance is obtained the cost of the scheme will be reduced considerably, which will save loading the land with the whole cost. When this scheme is completed and the area is carrying a sward of permanent pasture the carrying-capacity of the farm will be greatly increased.

Shelter.

It is now realized by all farmers that shelter-belts are essential on all farms to provide shade for stock during the summer and protection from cold during inclement weather. This is most important on the Northern Wairoa flats as they are subjected to cold westerly winds. Fig. 6 shows a view of the farm before shelter-belts were planted. In those days the farm had a very bleak appearance; stock were miserable in cold weather, and consequently production was low.

A programme of shelter planting has been carried out on the farm over the last nine years, and Fig. 7 shows a tight belt of pampas-grass, which has proved to be a very valuable shelter plant on this more or less wet clay soil type.

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TERMS ACCEPTED.

Cupressus Benthami has also proved to be a very suitable shelter-tree for this soil type.

There is no doubt that the improvement in butterfat-production which has taken place during the last few years can be attributed to a certain extent to the warmth and protection the herd is now receiving from the shelter-belts planted during the earlier years. There is still room for further work in this direction on the farm, and each year the Committee has been planting further belts. *Cupressus macrocarpa* has been tried, and, although slower in growth than *Cupressus Benthami*, it is also proving a satisfactory shelter-tree on the farm.

Further belts of pampas-grass are being planted, and perhaps the best method of establishing first-class shelter on the Northern Wairoa clay flats is to plant a row of pampas-grass and two rows of *Cupressus Benthami*, so that the pampas will protect the *Benthami* from the salt-laden westerly winds during the early stages of establishment. These winds have a burning effect on all unprotected shelter-trees, and the pampas forms an excellent protection from the damage which can be done. Pampas-grass thrives along drain sides, and, while it gives complete shelter, its shade also prevents the sides of the drains from crumbling, which eliminates a great deal of drain-cleaning.

Improvements.

In addition to the improvements carried out in the accommodation for pigs, a new milking shed and plant was erected, concrete drinking-troughs constructed in each paddock, old Taranaki gates replaced by substantially-hung wooden ones, and approximately a third of the fences on the farm renewed during the three years under review.

The new milking-shed (Fig. 8) was a long-needed want. It has been fitted with all modern appliances and is kept in perfect order by the farm staff. Cleanliness is the secret of success in obtaining high-grade cream, and during the 1936–37 season (the first season the new shed was in operation) 95 per cent. of the 17,615 lb. of butterfat produced was graded superfine.

The improvements carried out during the last three years have made a great difference to the appearance of the farm, and it is now reaching a stage when the farmers in the Northern Wairoa district are proud to be associated with it. The extra facilities now available will assist greatly in carrying out experimental work, and the possibilities of the farm from an experimental and demonstration point of view are very bright.

Field-days.

Fifteen well-attended field-days were held on the farm during the last three years. Demonstrations of harvesting machinery, pasture harrows, ensilage-making, and stock management were given. The farm has been used each year for holding the championship parade of the Northern Wairoa calf clubs, and the agricultural students of the Dargaville High School have regularly attended demonstrations on the pig lay-outs and pasture establishment, while lately the Northern Wairoa Jersey Club has used it for its annual demonstration.

Conclusion.

In conclusion, the writer would like to express his thanks to the members of the Committee who, during the three years under review, gave up so much of their valuable time and assisted so greatly in bringing about the improvement which has placed the farm on its present sound footing. The manager also warrants favourable mention for the capable manner in which he carried out his share of the work, which has been instrumental in raising the standard of the farm.

Careful planning, combined with judicious spending, has been rewarded with success during the 1934–35, 1935–36, and 1936–37 seasons.

Fig. 9.—A picture of one of the numerous field-days held at the farm; farmers attending a talk and demonstration on pig-diseases conducted by a Government Veterinarian.

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Liming in Otago.

W. R. Lobb, Instructor in Agriculture, Dunedin.

When considering the question of liming in Otago it is important to understand something of the extent of the province, its topography, its extensive hills, its large runs, and also the extent of the large central area with a very low rainfall. These are all factors that are reflected to some extent in the economy of additional charges on the land. Intensive farming in Otago is the exception rather than the rule, as can be gathered from the fact that the average size of the Otago farm is more than 1,000 acres.

Amounts of Lime used.

The following table shows the amounts of lime delivered at officered railway-stations, and therefore does not include the quantity carted from the works by road :—

District.	1931–32.	1932–33.	1933–34.	1934–35.	1935–36.	1936–37.	1937–38.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
North Otago ..	799	752	1,077	1,625	2,285	2,695	4,549
Otago	2,614	3,140	2,842	4,108	4,462	5,288	6,535
South Otago ..	8,606	9,865	11,743	14,811	16,907	18,470	18,066
Central Otago ..	287	338	366	685	889	1,085	1,322
Total ..	12,306	14,095	16,028	21,229	24,543	27,538	31,072

This shows that liming has been an important factor in Otago's agricultural system for many years, and, further, that the use of lime is still increasing. The main reasons for this rapid increase are—

(1) Increased use of lime as a pasture improver, and the increase in pasture farming.

(2) The less costly and more efficient methods of application.

(3) A more widespread knowledge of the value of lime, both for crops and pastures, and a realization that liming forms part of a "long-time" policy, and that the spectacular is not to be looked for.

Next to Southland, Otago is one of the foremost provinces in the total quantity of lime used. The quantity of lime used, however, would be very misleading to those who do not realize that approximately a quarter of New Zealand lies south of the Waitaki River. When the amount of lime to the area of sown grass is compared, a very low per-acre figure is obtained.

Taking into account the larger area of sown grass (from 1,212,240 acres in 1931–32 to 1,245,416 acres in 1936–37), the increase in lime used on a per-acre

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basis would be from ¼ cwt. per acre to a little over ½ cwt. per acre over that period. This does not allow for the lime carried direct from the works to the farm, which, however, would be more than counterbalanced by the amount of lime used with the root and rape crops. It would appear from this that there is a considerable margin between the present-day and the optimum economic use of lime.

Liming and the Root Crop.

The root crop is as essential to the farmer in Otago as is petrol to a motor-car. It is in the dairying and fattening areas that the bulk of lime is used, and a considerable amount of this lime is applied in the preparation of ground for the root crops, up to and exceeding 1 ton to the acre being used.

The amount of burnt lime used on such areas is considerable, and may be warranted as a quicker acter against the ravages of club-root. To-day, however, the use of burnt lime as a pasture dressing is going out of favour, as the farmer is prepared to obtain his results over a period of years.

Large Area gives little Response.

From the table it will be seen that the central districts use very little lime. This may be due to several factors, of which the most important is the nature of the soil. These schist-formed soils are of such a nature that applications of lime are not warranted. A large number of samples from this area have been tested and, in general, show no lime requirement.

Other factors which limit the use of lime here are the cost of cartage, the low rainfall, and the concomitant extensive type of farming. It must be remembered, however, that after continued irrigation of these lands it is quite likely that there will be an increased need for the use of lime, due to the leaching of lime to lower levels and to its removal in the form of stock products.

Accessibility of Supply.

There are a few areas where the cost is the limiting factor to the increased use of lime, notably beyond the rail-head at Kurow and Ngapara, Taieri Mouth, Hillend, and the coastal portions of the Bruce County. The Otago Peninsula and the central districts are not well served by rail, but it is doubtful whether this factor has as yet any great influence on the amount of lime used, as both show little response to its use.

Time of Application and Effect on Supply.

There are sufficient works operating in Otago to supply the demand, but, due to the seasonal nature of the time of application, there is a tendency for an overload at the peak season. With the increased knowledge that the results from liming are not immediate and therefore that the time of application not the all-important factor where lime is used as a pasture improver, this tendency is not so great to-day as was the case previously.

With co-operation between supplier and consumer this could still further be eliminated and could bring about harmonious working between all the parties concerned. This seasonal peak comes when the railways are taxed to their full capacity with stock and commodity transportation, which places limits on the trucking-facilities available for the full cartage of lime, a feature which organization could do much to improve.

Possible Expansion.

Any expansion that is likely to take place will be on those areas showing a response to lime and on the areas already more or less intensively developed in agricultural practice. It is unlikely that the cheaper means of distribution will have any influence on the amount of lime used on considerable areas of Otago, where the topography of the country is such that the cost of spreading is great and the benefits in cash return small.

The probable tendency will be, therefore, for more lime to be used where lime is already used to some extent, for more farmers in such areas to use it, and for those already using it to apply more frequent and heavier dressings.

Draft Allowance on Wool.

BY a Proclamation issued on 22nd June the Sale of Wool Act, 1937, was brought into force on 1st July, 1938. The Act abolishes the practice of making a deduction from the weight of wool, known in the trade as the draft allowance, in respect of any sale, agreement to sell, or contract of sale of wool made or entered into after 1st July.

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Care of Farm Fences.

THE winter months provide greater opportunities for the farmer to give attention to repairs and to make his fences secure than the summer when cultivation, sowing of crops, and harvesting keeps him busy. Time employed in a general inspection of farm fences and the carrying-out of the necessary repairs will undoubtedly save much trouble later on. Poor-conditioned fences involves bad friendship with neighbours.

Whatever the reconditioning or repair work that is required—restraining of wires, renewal of battens, strainers, posts, or stays—good, sound material should be used and the work done in a careful and workmanlike manner. It is false economy to use and work with inferior material. Under ordinary circumstances good, sound fencing-material will last for twenty years and more. On the other hand, inferior material will not last half that time, its use in no ways lessens the time or labour required in carrying out and completing the job, and very probably further attention to repairs will be required in a short time.

Fig. 2.—An ordinary fencing-post used as a strainer, clearly showing that the wires could not be strained taut because of the danger of the post lifting and thus making an insecure fence.

Before attempting repairs to fences it is essential to have a kit of tools in good order. The kit should comprise a leather bag to strap round the waist for carrying staples and small tools, a spade, a long-handled narrow shovel, a crowbar for stony ground, a hammer, a light axe, a rammer, a wire-cutter and staple-drawer, a file, a 1½ in. chisel, and a wire-strainer.

The even and adequate straining of all wires is important, and to ensure good work all straining-posts should be of good size—8 ft. long by 8 in. by 8 in. is a common standard size of strainer much in use—and properly footed and stayed. There is then no difficulty in restraining wires when doing a repair job.

The use of ordinary fencing-posts in lieu of the standard strainer is not recommended, although quite satisfactory for a short term. With the continuous strain of all wires and the attempts of stock to get through fences, they eventually lift and give way and are therefore unsatisfactory. A substantial straining-post, properly footed and made firm and

Fig. 1.—A standard size of strainer, adequately stayed, which allows good, sound work in straining wires in new or old fences.

securely stayed, is the foundation of good, sound work either in erecting new fences or repairing old fences. The facilities for the adequate straining of the wires is then good, and taut, strained wires make the fence.

Although strainers and fencing-posts of lasting timber are required the farmer at times finds much difficulty in securing small lots for his fence-repair work and may have to content himself with inferior timber for this purpose, but he can assist in the improvement and the life of the posts used by treating them with a preservative treatment of creosote. It should be borne in mind that the timber must be seasoned before treatment, and also that the bark must be taken off, as it prevents the timber being penetrated by the creosote, and by absorbing it, causes waste.

—C. S. Dalgliesh, Fields Instructor, Rotorua.

Harrowing and Spring Management of Pastures.

GRASS harrowing plays an important part in grassland management in North Auckland, where paspalum is so dominant in most pastures on dairy-farms. The dry weather, which continued late into the past autumn, prevented many fields from receiving the usual harrowing prior to the autumn top-dressing. Again, top-dressing was delayed and spread over a longer period in waiting for suitable rains to wash the fertilizer off the growth before the fields were grazed.

Consequently, grass harrowing, which is widely carried out, will be very beneficial during July and August. It will not only prove useful on those pastures where there is still a matted or coarse growth, such as is a legacy from unchecked, matured autumn growth, but it will be advantageous on those paddocks which have been heavily stocked in May and June.

At this stage the harrowing should be drastic enough to spread accumulated droppings and also to produce a cultivating effect, which does much to stimulate rye-grass and clover growth and also to prevent paspalum becoming sod-bound. Good results are obtained if two harrowings are made, the second at right angles to the first.

In those districts characterized by heavy soils much harm can be done in the late winter and early spring if fields are grazed when the ground is soft and wet and not fit to carry stock. Later, pastures are invaded by buttercups, daisies, and docks. These weeds are often said to indicate lack of drainage, but they are found on relatively well-drained land which has been cut up by stocking while wet at this time of the year. These weeds gain their foothold on the bare patches which have resulted from the tramping of stock.

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Although buttercups may be controlled to some extent by mowing and are readily eaten down by sheep, it is best to arrange stocking so that the growth is eaten down as rapidly as possible, and then to shift the stock to another field before pugging occurs. Where hay and ensilage are fed during the coming few months it is wise to confine the feeding to one or two fields, and so to reduce the grazing and subsequent poaching of other areas. After feeding is finished a drastic harrowing of these fields proves beneficial.

—E. H. Arnold, Instructor in Agriculture, Dargaville.

Control of Ragwort.

THROUGHOUT the Bay of Plenty generally and in the western districts in particular ragwort has become a serious menace in pastures. It appears to thrive on the lighter pumice soil types, where the free nature of the soil permits of extensive root-development. Under such conditions invasion has been particularly rapid and has caused farmers much concern.

During recent years much attention has been given to control. Weedicides of various types have been freely used, and of these sodium chlorate has been most generally employed, both as a spray and as an ingredient of a dry mixture with lime. However it is used, the best that can be said of this material when employed under average farm conditions is that it provides a measure of temporary relief. If it is applied in the late winter or early spring, ragwort is severely checked and may not make any appreciable recovery until the autumn.

This enables farmers to provide reasonably ragwort-free pastures for their dairy stock throughout the high-production period of the year. Because of the extensive rooting-system of the plants in the light pumice soils there is some difficulty in getting complete kills of all secondary roots, so that a fresh crop of so-called " seedlings " may appear in the autumn following applications of sodium chlorate.

On the steeper hill country spraying and dusting becomes too expensive for general adoption, and on such country farmers have resorted to stocking with old ewes in an endeavour to control the weed. Undoubtedly this method had much to commend it, as definite control of the weed can thus be effected.

For the present, therefore, it appears that the soundest methods of ragwort control in the Bay of Plenty would consist in late winter and autumn applications of sodium chlorate on dairying pastures, coupled with sheep-grazing control on those parts of the farm which are difficult to spray or which are too remote or steep for dairy cattle

—C. Walker, Instructor in Agriculture, Tauranga.

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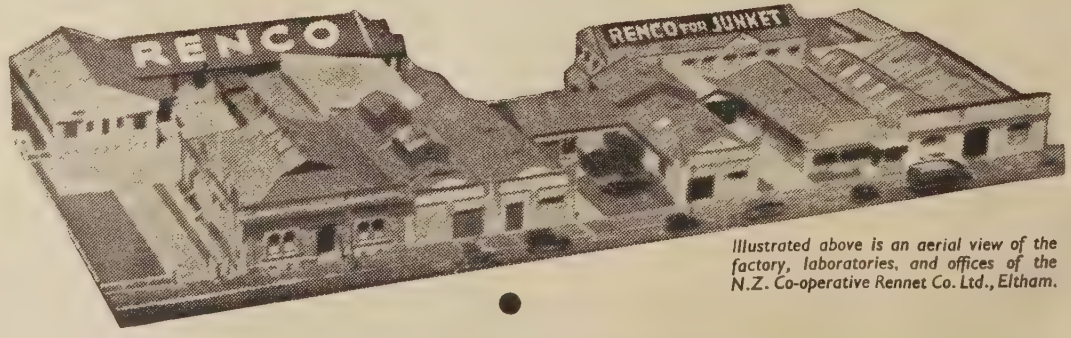

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ELTHAM.

Fencing to Soil Type.

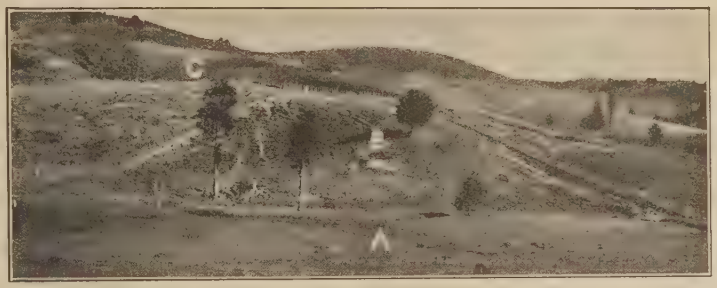
MANY farms in New Zealand cover several different types of soil, each of which requires special treatment if the best results are to be obtained. This special treatment can be given only when each field contains a single soil type, and this should be borne in mind when planting the subdivision of a farm which is composed of various soil types. It is essential, therefore, that fencing to soil type should be carried out as far as practicable. This applies to contour as well, for really the type of soil always changes with the changing slope.

In subdividing flat areas, sandy soils are sometimes unnecessarily included in the same field as clay soils. In the summer, when the clay flats will stand grazing, the sandy areas are burnt out and should be spelled, whereas in winter the sandy areas cannot be grazed because the clays become wet and poach badly. Peats and volcanic soils are often fenced with clays, and here again the same trouble is experienced.

The illustration shows the destruction of part of a clay hillside through its having been fenced with an alluvial clay flat. Clay flats are the complement of the hill soils; each grows feed when the other is not producing. Consequently, the intensive grazing required to manage the portion of the flat has proved too much for the hill portion of the field.

Rapid deterioration has taken place on the hill portion, with erosion exposing patches of subsoil over the whole area. When managed as a hill pasture should be, no deterioration of the sward, as is shown in the background of the picture, takes place.

—*E. B. Glanville, Instructor in Agriculture, Whangarei.*



Deterioration of part of a hillside following the wrong placing of subdivision fences A and B, two widely different soil types requiring different management are fenced together. The soil of B is badly eroded, whereas C, the same soil under different management, shows no deterioration. [*Photo by E. B. Glanville.*

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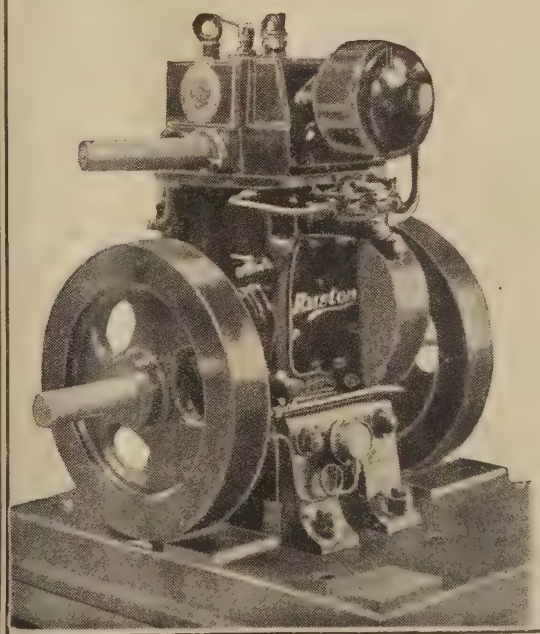

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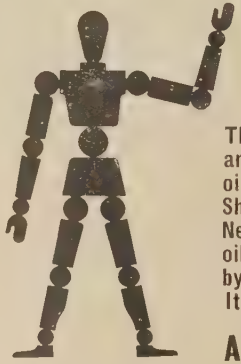

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Dry-dusting of Cereals.

THE seed treatment of cereals by the latest dry-dusting methods has developed enormously during recent years, and has been undoubtedly efficient in securing beneficial results. Particularly has this been the case in the control of stinking smut on wheat.

Various seed-merchants have installed machinery to treat cereals before sowing, but this has proved an unmixed blessing in instances where the men employed on the machine have not carefully cleaned out the cylinder and elevator shaft when changing over from one variety to another.

Degree of Contamination.

The accompanying photograph gives an idea of the degree of contamination liable to be experienced in the treatment of a small line of certified Cross 7 wheat.

It is admitted that had the line been larger the degree of contamination would possibly have been smaller and would not have been spread so evenly over the whole field. This degree of contamination represents a rogue count of approximately eight heads in 10,000, and, when it is realized that a count of this nature is more than sufficient to cause the rejection of a line as certified seed, the disappointment of a farmer entering such a line can be well imagined.

Much Blame on the Farm.

The majority of farmers, however, cannot attach all the blame for the contamination of seed lines to seed-cleaners, for it is on their own farms that contamination takes place. Only too often is the threshing-mill the cause, and it may be also the carrier of many weed-seeds, notably wild turnip. Southland provides good illustrations of the contamination of clean lines brought about solely on the farm.

Some years ago one of the leading flour-milling firms introduced an early-seed wheat. It was popular for some time and is still grown, but some lines contain as much as one-third of other varieties, which are, without exception, later maturing. As a result, the yield of this wheat has dropped by one-third and now is not so popular with growers.

In quite a number of cases no machine-dressed wheat has been sown on the farm, and consequently all the contamination can be placed directly on the threshing-mill.

—A. Stuart, Instructor in Agriculture, Invercargill.

Cross 7 wheat contaminated in dusting process.

Lessening Severity of Club-root.

IN view of the fact that there is no positive method of preventing in the field the attack of swedes and other crucifers by club-root, often no effort is made to resort to practices which lessen the severity of attack or to resort to negative methods.

It is interesting to record the opinion of several reputed farmers that in order to decrease the severity of club-root attack on the mica-schist silt loams of Inch Clutha it is imperative to postpone the ploughing of fields for swedes until such time as the soil is comparatively dry and works down easily into a good tilth with little cultivation. Fields which are in a sodden, sticky, and poached condition at the date of ploughing invariably result in a severely club-root-infected crop.

Difficulty is experienced in explaining this practice, but doubtless the water content and the physical condition of the soil influence the mobility of the club-root spores, which are the primary means of infection, and also the rapidity of germination of swede-seed and subsequent growth.

—A. F. Greenall, Instructor in Agriculture, Balclutha.

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Improvement of Grassland.

Fig. 1.—A sward of danthonia and moss and a few weeds grown on gum lands.

Fig. 2.—A sward of rye-grass, white clover, and paspalum grown on the same type of land as Fig. 1.

THE two accompanying illustrations are from two fields near each other. They exhibit two different swards, one of danthonia and moss and a few weeds (Fig. 1), and the other of rye-grass, white clover, and paspalum (Fig. 2). The soil growing the two so utterly different types of herbage is gum land, and is the same in each instance. This vast difference in the pastures in neighbouring fields is not uncommon north of Auckland.

The gum-land country consists generally of low, rolling downs, with a heavy soil, grey in colour, badly leached of plant-food, apt to be wet and sticky in winter and dry out in the summer, and difficult to cultivate. The danthonia sward is common where the country is grazed and has not received any fertilizer.

The rye-grass, white clover, and paspalum pasture can be attained only by attention to detail in drainage, cultivation, the sowing of suitable species of white clover and rye-grass, adequate stocking, and the application of lime and phosphate. All these factors play a part in the establishment of a highly productive sward. Gum-land soils which are to be sown to grass next autumn should have been ploughed in May, and should now be lying fallow. In the early spring disk harrows should be used to disintegrate the furrow before reploughing, and further disking to break up the soil before summer dryness makes the work difficult, if not impossible. The soil should be stirred occasionally during the summer with disks and harrows until late February or early March, when the sowing of the seed should take place.

The following mixture should be used :—

	Per Acre. lb.
Certified perennial rye ..	25
Certified white clover ..	2
Paspalum	5
Crested dogstail	2
Lotus major	1
Red clover	3
Cocksfoot	5
	43

At sowing time apply 3 cwt. or 4 cwt. of superphosphate or slag, and prior to sowing-time apply lime at the rate of 1 ton per acre. Another dressing of phosphate in the spring at 2 cwt. per acre is advisable. It should be remembered that either late sowing, a short fallow, poor cultivation, a poor white clover, or lack of phosphate and lime may result in partial or complete failure of the grass and uneconomic returns.

—J. E. Bell, Instructor in Agriculture, Auckland.

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"Series Names" of Soil Types.

A PORTION of the Fields Division's exhibit at the Waikato Winter Show was nine soil profiles (vertical sections from the surface) from the chief soil types of Waipa County. With each profile were four pasture turfs taken from experimental top-dressing plots on the same soil. One turf was from a "no manure" plot, another was from a "super" plot, a third was from a "super plus lime" plot, and the fourth was from a "super plus potash" plot.

The soil map of Waipa County, issued by the Soil Survey Division of the Department of Scientific and Industrial Research, was on the wall above these turfs and profiles, and white tapes ran from each soil profile to the map indicating the locality from which it had been taken.

Visitors were very interested in this display, and asked many questions. One of the points raised disclosed that the meaning of the names given to the soil types is not well understood. This article is published to explain the meaning of the "series name," or locality name, of a soil type.

Fig. 1.—A corner of the Fields Division's exhibit at the Waikato Winter Show. Note the soil profiles, turfs, and soil map at the right.
[Photo by E. R. Marryatt.

Terms Explained.

The usual question was: "How can the Horotiu sandy loam come from a farm at Ngahinepouri and the Te Kowhai silt loam from a farm at Rukuhia?" The explanation is that the first part of the name of a soil type—*e.g.*, Horotiu, Te Kowhai, &c.—is merely a mark to identify a group or series of similar soils. In plant classification, "clover" is a family name, or generic name, for a group of plants all of which have certain features in common, while no other plants but clovers have this group of characteristics.

Similarly, in soil classification, "Horotiu" is a series name for a group of soils all of which have resemblances which are distinct from the group characteristics of other series of soils. This part of the classification of plants and soils is shown in the following scheme:—

Plants.	Soils.
Generic name: Clover.	*Series name:* Horotiu.
Specific name: White, &c.	*Class name:* Sandy loam, &c.
Full name: White clover.	*Full name:* Horotiu sandy loam.

When anything new is discovered it is given a name to distinguish it from other things so that it may be referred to briefly and recognized clearly without actually producing it or pointing it out. For a

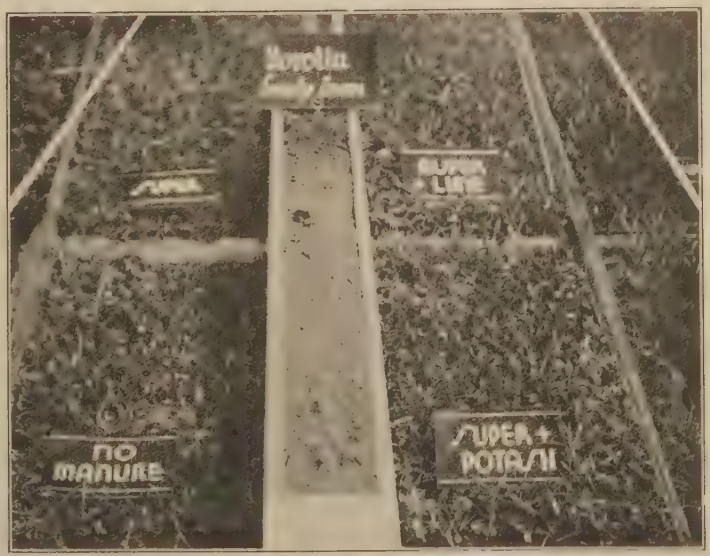

Fig. 2.—A close-up of soil profile and turfs from Horotiu sandy loam, from Ngahinepouri.
[Photo by E. R. Marryatt.

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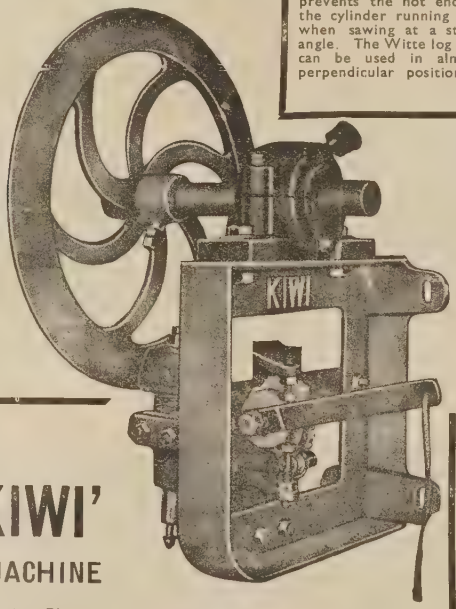

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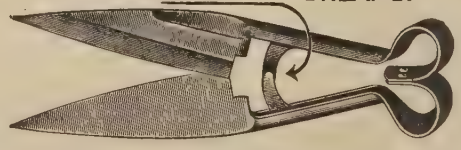

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series name, the practice in soil classification is to give a newly discovered series of soils the name of the locality in which they are first found.

Series not Restricted.

Obviously, a name so given, being merely a mark of identification, can convey no information in itself about the extent of these soils. In other words, the Horotiu series of soils are not necessarily restricted to Horotiu, nor the Te Kowhai soils to Te Kowhai. Indeed, as both series were formed by the Waikato River they may possibly occur wherever this river has made its oft-changed course.

I have seen them at Morrinsville, twenty miles from the present course of the Waikato River, and as far from Horotiu and Te Kowhai. Therefore, unless one knows by study the characteristics of the different series of soils the series name of a soil, in itself, conveys nothing more than the information that that particular series was probably first recognized in that particular locality when the survey was made. The only guides to the situation and extent of the various soil types which have been studied are the soil maps and reports of the Department of Scientific and Industrial Research.

—E. R. Marryatt, Ruakura Farm.

Winter-spelled Pasture Trials.

THE first lenient grazing of from about 8 in. to about 3 in. has been completed in the winter-spelled pastures in the Ruakura grazing trials. These pastures were closed in mid-April immediately after being grazed from 4 in. to 2 in. The growth to 8 in. took seven weeks. With one exception, the seven fields each carried twelve cows to the acre continuously for two day-grazings and two night-grazings before they were grazed down to 3 in. The exception was Field 9, which, grazed throughout the year, receives twice as much superphosphate and lime as each of the others.

The basic top-dressing for all twelve fields on the farm is superphosphate at 3 cwt., lime at 3 cwt., and potash at 1 cwt. applied in the late summer or early autumn. Field 9 receives another 3 cwt. of superphosphate and another 3 cwt. of lime in the early spring.

This pasture has constantly produced a little more than the others, and for the first period of winter-spelling this year the extra production on it was outstanding. It carried the cows for an extra day and an extra night before they had grazed it down to 3 in.

No Reduction in Clover.

This first round of winter-spelling and lenient grazing produced no apparent reduction in clover. I mention this not because it is unexpected, but because some farmers may be disappointed if the first round produces no visible results in reduced clover production. The fact is that the clover really begins to become weakened *after* the first round, and it is the cumulative effect of round after round which makes grass the winner in the spring.

Some farmers have asked for a guide to what area they should winter-spell. No figures for rationed grazing are available, but even without them it is possible roughly to estimate the approximate area necessary.

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ONE OF MANY TESTIMONIALS.

Amberley, June 14th, 1937.

Dear Sirs,—During the last four seasons I have been drafting Mr. C. A. Mowat's lambs that have been castrated and tailed with his instruments, I have never had a reject owing to arthritis or any of the ailments sometimes caused from marking with the knife. The lambs are well grown and healthy in every respect.

(Signed) DONALD McDONALD,
North Canterbury Freezing Co.'s Representative.

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Supplies also available from Stock and Station Agents and Merchants.

Let us assume that, when full-fed, a cow grazes for about seven hours in the daytime and for about five hours at night. Then, on the basis of the grazing in the Ruakura grazing trials, twelve cows will graze an acre of pasturage from 8 in. to 3 in. in twenty-four hours of actual grazing. So that if this acre of 8 in. pasturage be rationed to twelve cows for two hours only every day it is likely to last from a week to twelve days.

Area to be Winter-spelled.

As rationing is likely to be necessary or desirable for about a month in the early spring, 4 acres would be required for every twelve cows. That is to say, from one-quarter to one-third of the farm should be winter-spelled. As a common number of fields on dairy-farms is about twelve, this estimation of one-quarter to one-third of the farm being desirable for winter-spelling coincides with the recommendation made in previous articles to close about four fields for winter grass.

This prior recommendation of spelling four fields was made for another reason—by the time the fourth has been rationed-off in the spring the first will have recovered, so that a continuous supply of grassy pasturage will be likely. The writer would be glad to hear the experience of those farmers who winter-spell and ration the grazing in the spring.

—*E. R. Marryatt, Ruakura Farm.*

A typical winter-spelled pasture ready for grazing.

[*Photo by E. R. Marryatt.*

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From 2 ozs. daily to 4 ozs. daily is the quantity for skim milk fed calves and from 3 ozs. daily rising to 6 ozs. daily for whey fed.

It can be fed by mixing with boiling water in the early stages and later simply fed dry in the bottom of buckets after the by-product.

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Section for Irrigation Areas.

Contributed by Officers of the Fields Division.

Producing New Pastures.

G. G. Calder, Instructor in Agriculture, Alexandra.

GRAPHIC examples of how new pastures are produced by irrigation are given in the accompanying illustrations.

Looking down on Galloway Flat, Fig. 1 shows the headwater race in the foreground with a lateral from it branching into two contour races which irrigate the slopes beneath them. In the foreground can be seen the gravelly nature of the land and the sparse vegetation (mainly hair-grass) which it is carrying.

The two following photographs were taken to show the class of sward above and below the contour race. The whole slope was sown with the same grass-seed mixture before the contour race was put in.

Fig. 2 shows the dried-up, open nature of the unirrigated pasture, which is composed mainly of hair-grass, sorrel, and odd stunted rye-grass plants—in

Fig. 1.—The headwater race with a lateral to two contour races.
[Photo by H. Drake.

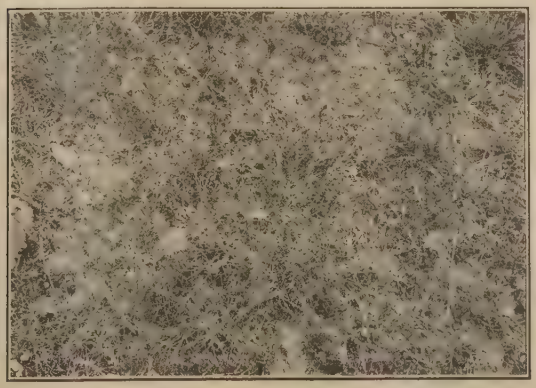

Fig. 2.—Showing the dried-up and open nature of the unirrigated pasture.
[Photo by H. Drake.

Fig. 3.—A typical sward in an established irrigated pasture.
[Photo by H. Drake.

short, a very low-producing pasture totally unsuited for dairying.

Fig. 3 is taken below the water-race, and is typical of many of the established irrigated pastures. It is composed mainly of rye-grass and white clover, with dogstail, cocksfoot, Yorkshire fog, and *Poa pratensis*. This is excellent dairying pasture, which is carrying 0·82 milk and dry cattle per acre.

The difference between the two areas is practically all due to irrigation water, as during the last six years no top-dressing has been applied, although previously superphosphate was used.

New Zealand Pear-export Trade.

A. POWELL, Cool Storage Officer, Wellington.

THE export of New Zealand pears is an important branch of our export trade which requires attention with a view to adopting methods which have proved their value in other countries. The two most important factors to be considered for improvement are :—

(1) The pre-cooling of all pears before packing.
(2) The working over of the pear-trees to six or eight of the most favoured varieties.

To obtain more successful results on the overseas markets better pre-cooling methods are necessary in order to reduce the risk that the condition of the fruit will be affected by any shortcomings on our part in failing to adopt modern methods of pre-cooling prior to shipment.

Procedure after Picking.

When pears are ready for picking they should be placed in cool storage as soon as possible and reduced to a temperature of 30° to 32° F. They should not be wrapped before being pre-cooled at this temperature for three days. They are then brought out in small quantities of twelve cases to a packer, wrapped and packed, and immediately returned to the cooling-chamber to remove the heat from the package.

When pears are to be brought long distances by rail it is essential that insulated, iced trucks should be used. It is also advisable that cool chambers should be available in coastal steamers which feed the central concentration pre-cooling store at the point of loading of overseas vessels.

Now that conditions on the overseas ships have improved, fruitgrowers must play their part in placing the pears on the overseas markets in a condition that will give the buyers time to distribute and the retailers time to sell without loss and complaint to the consumers. With a knowledge of our methods, those responsible for selling our pears will have every confidence in handling and recommending our product. This will, again, be reflected in the confidence of the consumer by his inquiring for and purchasing with confidence our brand of pears.

Storage in London.

Very often our pears have to be held in storage in London when the markets are glutted and then transhipped to other European markets. It will be readily seen that much of the success or failure in procuring the best sales and highest prices for our article is in our own hands.

In some other pear-exporting countries shipments continue until early in July, and for some years past the best prices have been realized for fruit on the late boats. Pear shipments in New Zealand are completed about the end of April.

Most of the countries exporting pears have worked their varieties over to about six or eight of the best and most sought-after varieties on the English and European markets. These are Packham's Triumph, Beurre Bosc, Winter Nelis, Winter Cole, Josephine, and Du Comice. A few of the other varieties are still being exported, such as Howell, Glou Morceau, and Keiffer, but the tendency is to concentrate on the first-mentioned six varieties.

As has been indicated, we can improve our pre-cooling methods and gradually work over our trees, as recommended, in order to produce larger quantities of the varieties most highly favoured overseas. In striving to do this we will be doing something to place our pear-export trade on a high level equal to the standard set by other export commodities.

—A. Powell, Cool Storage Officer, Wellington.

A Nelson farmer sowed one paddock with certified rye-grass as a base and three with seed bought from a merchant as "from certified origin." The certified area is the only one throwing any feed after two years, and the rest has gone under the plough again.

A History of the

NEW ZEALAND DAIRY INDUSTRY

by

H. G. PHILPOTT, Dairy Division, Department of Agriculture.

IN this book, for the first time, the historic details regarding the development of New Zealand's great industry have been gathered together—the work of the pioneers, the founding of the dairy factories, refrigeration, co-operation, establishment of export trade, grading, home-separation, importation of dairy cattle, legislation, &c.

The book contains more than 400 pages, and is printed on high-quality paper, with illustrations on art paper. It is available at cost of publication—namely, FIFTEEN SHILLINGS per copy, or 15s. 8d. post free. (N.B.—Cheques must bear exchange.) *Copies may be had from—*

The Director-General, Department of Agriculture, Private Bag, Wellington, New Zealand.

The Edition is limited to 500 copies, and is rapidly selling out.

Horticultural Instruction.

Contributed by Officers of the Horticultural Division.

Orchard Notes.

Pruning, Spraying, and Manuring.

As the pruning season is well advanced, growers should make every effort to complete the work before spring opens up and spraying commences. The gathering-up and destruction of all prunings should be carried out either as the pruning is proceeding or as soon as possible after operations have finished. By attending to this matter many pests and diseases which might otherwise prove a source of trouble in the future are effectively destroyed. Many growers merely collect the heavier prunings and deposit them either at the side of the orchard or any convenient spot in the orchard, a practice not to be recommended because of the possibility of spreading disease from one place to another.

The notes in the two previous issues of this *Journal* on the subject of pruning should be followed as closely as possible, always bearing in mind the main principles to be followed if the best results are to be obtained. The elimination of overcrowding leaders, the removal of old and worn-out fruit spurs to make room for new fruit-bearing laterals, the spacing of all fruiting wood as far as possible to enable the maximum amount of sunlight to penetrate through the tree, and the maintenance of a fair average growth every season will do much to help in the production of crops of good quality and quantity, and in some measure help to correct the biennial cropping habits of some of the varieties grown. Spraying will be much easier and more effective if these principles are put into effect.

Spraying.

A reminder is now given to growers that the spraying season is approaching. Consequently, the overhaul of the spraying outfit should receive attention at the earliest opportunity. Worn-out parts should be replaced, and the engine and pump should be thoroughly cleaned and oiled, to save loss of time when operations actually commence. Test out the hose and nozzles to see that no waste is likely to occur in that direction.

Spraying-supplies for the season as far as practicable should be ordered, and delivery arranged for well in advance of the time they are likely to be required. While the success of pest and disease control in the orchard depends largely on the correct spray being used at the proper time, it is necessary to be able to apply the spray with sufficient pressure so as to ensure it being driven to every portion of the surface of the tree. This cannot be accomplished unless the outfit is in good working-order.

There still appears to be a certain amount of guesswork used when weighing or measuring ingredients. As an example, any one asking an orchardist at what strength he is spraying often gets the reply of "round about 1 in 60." This "round about" is not good enough, as it may mean anything from 1 in 30 to 1 in 90, a great difference. It might mean on the one hand the possibility of doing much damage, and on the other effecting little control and the wasting of good spraying-materials. It is therefore important that accurate weighings or measurings should be adopted.

Knowledge of Pests.

Before the spraying season starts, growers would be well advised to obtain as much knowledge as possible of the various pests and diseases found in the orchard in order to do the work more intelligently should those pests or diseases appear. The life-history, method of attack, seasons when prevalent, whether chewing or sucking insects, fungous diseases, or bacteria should be known. With this knowledge the orchardist will be better able to decide on the most suitable spray to use.

With regard to fungous diseases, the spores are often invisible to the naked eye, and consequently may be on the tree long before any outward signs of the disease are noticeable. Further, when once established they may not easily be eradicated. It is therefore necessary to adopt the old adage of "prevention is better than cure," and to apply the necessary sprays before the spores have a chance of establishing themselves. Advice regarding the sprays to use and the strengths and times of applications can be obtained from the local Orchard Instructor for the district.

Manuring.

During the past few seasons many growers have adopted a set programme for manuring; some are more spasmodic, while others pay very little attention to this all-important subject. It appears that they do not realize that it is impossible for a fruit-tree to carry on profitably for any length of time without the food-supply being replenished to replace that which has been taken out of the soil in the annual production of crops. Although manurial programmes will differ somewhat in the different districts, according to the nature and fertility of the soil, it should be remembered that in those soils known to be insufficiently fertile

money spent on manures and fertilizers is well spent, and that better results in tree and fruit production will be obtained in the future.

While giving only a few general hints with regard to manuring, it is necessary to appreciate that what is known as a complete manure is made up in the main of three substances—nitrogen, phosphoric acid, and potash. As a general rule, any nitrogenous manure produces growth and heavy leafage, and consequently could be used with advantage on trees that have become debilitated. With the average growing tree an excess of nitrogen is liable to cause sappy growth, unripened fruit buds, and fruit of poor colour and soft texture. Such fruit breaks down easily after a relatively short period of storage.

Use of Potash.

The use of potash has increased very considerably during the past few seasons, and good results have been obtained from its use. It is claimed that by the use of potash much better quality fruit is obtained, the colour and texture being superior to that obtained when potash is not included in the mixture. Fruit buds for the following season appear much healthier by its use, while the fruit will hold up longer in storage and is less liable to bruising when being transported to market.

The quantity of manure to be used differs in different parts, but some recognition must be made of the fruit yield. It would be only natural to assume that a fruit-tree bearing heavily every year would require a good supply to enable it to carry on from year to year. The average rate of the mixture should be from 2 lb. to 6 lb. per tree according to age, growth, cropping, &c., and as a general rule approximately half the quantity should be phosphoric acid in the form of superphosphate, a quarter in potash in the form of either sulphate or muriate, and a quarter in nitrogen in the form of ammonium sulphate. Here, again, the Orchard Instructor for the district, who has a knowledge of soil and tree conditions, should be consulted.

General.

Grafting.

A certain amount of grafting is done every year, and it is necessary at this time of the season to select the scions required for the work. These should be taken from well-grown trees of good fruiting habits, and should be wood of the previous season's growth, clean and well ripened. As these scions will not be required for a time they should be kept in good condition by being either deeply "heeled-in" or placed in a shallow trench covered lightly with soil in a somewhat sheltered cool position, or they may be held in boxes of slightly moist sand in cool storage.

Planting.

Trees received for new plantings should be "heeled-in" firmly until the soil in the orchard is in a suitable condition to receive them. When planting, an application of blood-and-bone manure at the rate of about ½ lb. per tree will help to give the trees a start in the spring.

Shelter.

Shelter-belts are most necessary where orchards are planted in exposed positions. Mistakes have been made in the past by the planting of shelter-belts too close to the outside rows of trees in the orchard. This makes proper cultivation impossible, while the last tree in the row suffers considerably. Whatever kind of shelter is decided on, care when planting, an application of manure, and frequent hoeings during the first season will result in better growth.

Drainage.

The cleaning-out of existing drains and the digging of new ones where required in the orchard should be delayed no longer. Superfluous water must be carried off the orchard as soon as possible for the welfare of the trees and to prevent their suffering from the effects of "wet feet." This can be accomplished only by an effective system of drainage.

—*George Stratford, Orchard Instructor, Motueka.*

Citrus Culture.

Harvesting and Manuring.

THE harvesting of sweet oranges calls for the exercise of careful judgment in the matter of maturity. The colour of the fruit is very little guide as to maturity, for in most instances the fruit will have assumed the full orange colour many weeks before it is fit for harvesting. The sweetness of the juice is the only dependable guide, and no fruit should be picked until the maximum degree of sweetness has been attained.

No fixed dates can be set for the commencement of harvesting the different varieties, as both the season and the locality are liable to make considerable differences in this respect. However, under average conditions there are few, if any, varieties that are fit for harvesting before the middle of July, and in certain localities fruit that is reasonably fit for marketing at this date will improve in flavour if allowed to remain on the trees for a further few weeks.

Loss of Juice.

There is a tendency with certain varieties, particularly some strains of the navel orange, for the fruit to loose its juice if it is allowed to remain on the trees for any appreciable period after becoming fully sweetened. Especially does this apply to the Navelencia variety. The weakness is most pronounced in young trees that are making vigorous growth. Where the danger exists, care must be taken to harvest the crop before the loss of juice commences.

The Ruby Blood variety should not be picked until the blood colour is plainly visible in the rind and in the juice. Late varieties, such as Valencia, St. Michael, and Leu Gim Gong, should never be harvested before October. Sweet oranges will improve by storage for two to three weeks after picking, but the degree of sweetness at the time of harvesting will remain much the same no matter how long the fruit is held in storage.

Manuring.

Consideration should now be given to the manurial programme for the coming season. This is a matter that must be determined largely by the individual orchardist, since soil conditions vary extremely in different localities. As mentioned in these notes last January, no amount of fertilizers applied to citrus trees will compensate for lack of organic matter in the soil, and this fact is repeated because it is most important that growers should fully appreciate the position.

Animal or bird manure of any kind provides most valuable humus and, where available, should be used in large

quantities. The bottoms of old haystacks are also valuable as a source of humus.

Where little or no humus is available other than by means of a cover-crop, relatively heavy applications of fertilizers are found to be necessary on many types of soil to maintain the trees in a healthy state.

Suitable Programme.

Taking as a basis an application of 2.5 lb. of nitrogen, 2 lb. of phosphoric acid, and 1 lb. of potash as presenting a satisfactory rate of dressing of a mature tree, the following programme is suggested as being suitable for New Zealand conditions, but may be modified to meet individual requirements :—

	Quantity of Fertilizer.	Analysis of Content.		
		Nitrogen.	Phosphoric Acid.	Potash.
	lb.	lb.	lb.	lb.
August.				
Sulphate of ammonia ..	6	1·21	..	..
Blood and bone ..	5	0·32	0·57	..
Sulphate of potash ..	2	..	..	1·0
November.				
Sulphate of ammonia ..	3	0·6	..	..
March.				
Blood and bone ..	6	0·39	0·69	..
Superphosphate ..	4	..	0·8	..
Total	26	2·52	2·06	1·0

The August application should be made prior to the spring ploughing and about one month before the commencement of top growth, while the November application should be made just prior to flowering. The March application should if possible, precede the autumn rains, the superphosphate being sown, in part at least, with a cover-crop. Other materials may be substituted in place of those suggested if they serve as a cheaper source of supply of the nutrient concerned —*e.g.*, well-matured fish-manure may replace blood and bone. For younger trees the amounts will be proportionately less, but there seems no valid reason why the proportions of the various elements should be materially different.

—*Percy Everett, Orchard Instructor, Gisborne.*

Viticulture.

Scope for More Vines.

THE time to plant vines is approaching. From the remotest periods of which we have records the fruit of the vine has been a chosen food of man. The vine was carried by man in his many migrations in the past and planted wherever it would grow, and so the grape has come triumphantly through the test of ages. Jewish, Greek, and Roman viticulturists have left us some very sound advice on the subject of vine-culture, much of which is followed to the present day.

Grape-growing has proved to be a great colonizer in many countries, as it is a profitable industry that can be pursued on poor land, which becomes rich land in the process, for the wealth of a locality is most truly indicated by the number of inhabitants who can maintain themselves in a state of prosperity on the produce of its soil.

Profitable Vine Culture.

Dr. Guyot, a leading French authority on vine-culture and economics, informs us that the products of poor soils which give good profits are a great asset to a country in that they increase the demand for those products which can only be grown profitably on other types of soils. He goes on to say that the cultivation of vines in a district means closer settlement, for more people can be profitably employed on a few acres of vines than on quite a big general farm. I think those who are acquainted with viticulture will agree with him.

There is, of course, a limit to the extent of profitable vine-culture, as is the case with any other culture—a limit controlled by the requirements of those who, because of the nature of their employment or the natural conditions of the localities in which they live, cannot grow grapes themselves.

It will probably interest many who may be under the impression that grapes can be grown successfully outdoors only in hot climates and in glasshouses that the grape is really a fruit of temperate climates and that both extremes of heat and cold are unfavourable to the development of its highest qualities.

Many Suitable Varieties

There are more than five thousand varieties of grape-vines actually cultivated in the world, and among these are many varieties suitable for growing throughout this Dominion on favourable sites from Stewart Island up to the North Cape. A number of these varieties have been introduced by the Department of Agriculture into New Zealand from time to time from Europe and America in order to test their suitability for growing under our climatic and other conditions, and some very satisfactory varieties have been selected and made available to the public. The Horticulture Division has at present more than three hundred introduced varieties under observation in its experimental vineyard at Te Kauwhata, which intending vine-growers should not fail to visit.

Not only are many varieties of vines suitable to our climatic conditions, but they come to perfection on our various soils. As a matter of fact, vines are not very exacting so far as soils are concerned, and they produce heavy crops on our poorest lands, such as gum lands and light volcanic land, and on almost pure sand.

The most important centre of table-grape production in the Dominion is situated near the Government experimental vineyard at Te Kauwhata, Waikato, where there are more than thirty private owners who dispose of their fruit on the Auckland market and elsewhere. Wines are produced mainly in the Auckland and Hawke's Bay districts.

Value to Health.

An Italian authority on viticulture, Signor Pollacci, speaks of the grape as an agreeable, wholesome, desirable, and generous fruit. This is one point, at least, on which all doctors agree, for they recommend the ripe fruit of the vine to both the healthy and the sick, even when other foods are not permitted. It is said that an apple a day keeps the doctor away, but the grape has evidently a greater claim on our esteem, for it not only preserves health, but also forms the basis of systematic cures ordained by some of the leading health authorities of the world.

One of the principal factors which renders the grape so valuable as a nutritious and sustaining food is the sugar,

of which grapes contain more than other fruit in a form known as glucose, or grape sugar, which, requiring practically no digestion, is easily and rapidly assimilated into the blood. This property gives grape sugar four times the value as a food compared with refined cane sugar. Grapes also contain, in addition to valuable mineral constituents and fruit acids, albuminous and fatty matters, comparatively large quantities of ferments, and valuable vitamins.

With regard to the ferments, it is well to remark here that the spores of the ferments, or yeast, are found in considerable quantities on the bloom which covers the skin of ripe grapes, and these germinate rapidly when they come into contact with a favourable medium, such as grape juice.

Value as Daily Food.

It can easily be realized that because of the large quantity of easily assimilable natural fruit sugar and other body-building materials grapes can be utilized to advantage as a valuable addition to the daily food of growing children. In addition to other valuable qualities, the grape has a considerable æsthetic value which stimulates the appetite.

Table grapes can be employed for making the unfermented grape juice which is now imported from Canada, the Eastern States of America, and California. Our Albany Surprise grape is equal to any American grape grown for that purpose; in fact, it is identical with the variety known as the Pierce grape, which is the best Californian variety for making unfermented grape juice. When grapes are plentiful they can be used for making jam, grape butter, spiced grapes, mock gooseberry pies, pickles, and even vinegar. For making good wines it is preferable to plant wine varieties.

A good time to plant both table and wine grape vines or vine-cuttings is during August.

—J. C. Woodfin, Vine and Wine Instructor, Te Kauwhata.

Control of Jonathan Scald in Cool Storage.

IN the control of Jonathan scald the apples must be placed in cool storage *immediately* after being picked. The storage temperature should then be held at 38° F. for two weeks, and gradually reduced over several weeks to 33° F.

The Jonathan scald commences to develop late in May, and continues for some weeks. The amount of loss is dependent on soil conditions, rainfall at critical periods, and cool-storage temperatures.

—A. Powell, Cool Storage Officer, Wellington.

Railway Transport, *YES!*

The Industry That Made New Zealand.

If you doubt this statement, ask the timber-millers, the coal-mine owners, the farmers, the manufacturers and the merchants. Railway transport has been, and still is, the basic industry for national welfare. Prosperity cannot be fully maintained unless the railways, which offer the best service, receive their proper measure of support.

The People's Railways for the People's Profit.

Cool Storage Notes.

Inspection of Fruit.

PEARS in storage should be examined, and if decay is present they should be sorted out to avoid further loss from contact. In making an inspection of the pears in cool storage it is always advisable to examine the Winter Nelis first, as this variety is more subject to injury and rots than some of the other late varieties. It is an advantage to cool store pears naked in orchard cases, both for cooling and re-sorting purposes.

Most of the fungal rots and grey mould specimens found have signs of injury, such as is caused by stem punctures, grubs, or caterpillars, &c. The use of copper sulphate paper is an advantage, but it is somewhat expensive.

If the Winter Cole variety is stored in cool chambers using the dry-air circulating-system wilt will soon be in evidence. Direct expansion cooling, especially when the cooling-coil is on the ceiling and is giving a good, even distribution of cold air throughout the chamber, is superior to any other form of cooling, particularly for the Winter Cole variety. Under these conditions, and with temperatures held at 30° to 32° splendid results are obtainable.

"Black eye" is a peculiar dark-brown marking found in or near the calyx end, or eye, of the pear. In appearance it is not unlike the burn of hydrochloric acid caused when this acid is used to remove spray residue from the surface of the fruit. "Black eye" is the direct result of either a weakness at the root of the tree, faulty stock, or unbalanced food conditions, &c. A careful investigation will in most cases reveal the cause. It is seldom, if ever, found on fruit from strong-growing, healthy trees.

The larger grades of most varieties of apples should be closely inspected for signs of deterioration, especially Delicious, Jonathan, London Pippin, Rome Beauty, and Statesman. Fruit from young trees and light crops should be carefully inspected from now until it is marketed.

Apples still in the sheds and orchards, or even in cool storage, should not on any account be held until acute breakdown is noticeable by a mealy or excessively wilty condition. It is most important that all fruits should be sent to the markets while it still has sufficient life to withstand the handling necessary during transport.

Time is then necessary to enable it to be displayed for sale and held long enough to be consumed without loss to the retailer and consumer. Fruit must be marketed when still in prime condition if we are to retain the confidence of the public and thereby increase the sale of our product.

The blowing-out of cool chambers two or three times each week early in the morning for ten minutes each time is very necessary, as very little accidental ventilation is possible during the next few months.

—A. Powell, Cool Storage Officer, Wellington.

Farmers!

GUARANTEE

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FINANCIAL WELFARE OF YOUR DEPENDENTS

BY EFFECTING

ADEQUATE ASSURANCE

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GOVERNMENT LIFE INSURANCE DEPARTMENT.

Every Year a Bonus Year.

ALL FUNDS INVESTED IN NEW ZEALAND.

Vegetables, Small Fruits, and Flowers.

Contributed by the Horticultural Division.

Sowing Season and Use of Fertilizers.

Vegetables and Culinary Fruits.

SEED-TIME and harvest are proverbially busy periods in agriculture. The former now begins in earnest, and to obtain good results the work must be done during favourable weather and when the soil is sufficiently dry. During the springtime such periods are comparatively rare, and the utmost advantage should be taken when they do occur. It is for this reason that land under intensive cultivation should be well drained, and if it is on the light side it is an advantage, especially where early crops are grown or the summer crops are of the class known as half-hardy.

Where the land has been well prepared, as described previously, by suitable cultivation, by the supply of the necessary humus and lime as required, and also by clearing it of weeds (perennial and annual) and allowing it to settle, a moderate dressing of fertilizers worked in is all that is required in most instances before sowing and planting may be done in the most satisfactory manner.

Differences in Practice.

The practice in the use of these fertilizers at this stage differs rather widely, some applying a ton or more per acre, equal to about ½ lb. per square yard, and others about one-quarter of that amount, the former being of the opinion that what is not used by the ensuing crop will be available for crops which follow. It should be remembered that in practically all quantitative experiments with fertilizers there is an optimum amount, to exceed which results in a loss of crop and not an increase on that resulting when the optimum quantity is used.

The value of most of these fertilizers lies in their solubility, which makes them readily available, and moderate dressings —repeated at intervals, if necessary— are generally the most suitable method of application, especially on a soil which is inclined to be light. The type and amount of fertilizers to be used with annual crops is governed by consideration of the behaviour of previous crops, more particularly the last, of the soil and its condition in the light of recent treatment, and the special requirements of the crop about to be planted

Some Crops for August.

In most districts the following crops may be planted during August, results depending very largely on good preparation of the land and planting when the soil is sufficiently dry to be friable: Asparagus, rhubarb, early potatoes, artichokes, cabbage, cauliflower, lettuce, autumn-sown onions, and, in the unheated glasshouse, tomatoes.

Important sowings at this season are asparagus (to produce strong one-year-old crowns for planting out twelve months hence), early peas, broad beans, early carrots, parsnips, globe beet, early turnips, main-crop onions in the drier districts, lettuce, radish, spinach, parsley, cabbage, cauliflower, and, towards the end of the month under glass, tomatoes, celery, melons, cucumbers, marrows, egg-plants, and peppers for planting out when spring frosts cease.

Fertilizer Requirements.

Such root crops as carrots, parsnips, beet-root, turnips, and radishes require principally phosphates, with a liberal supply of potash and small quantity of nitrogen. On land well manured for the previous crop and deeply cultivated since the following fertilizers may be broadcasted per acre and well harrowed in before drilling the seed: 4 cwt. to 5 cwt. superphosphate, 2 cwt. sulphate of potash, 1 cwt. sulphate of ammonia.

For such crops as potatoes, artichokes, onions, leeks, and shallots the requirements are principally potash, with a moderate supply of phosphates and a small amount of nitrogen. For these the following fertilizers may be incorporated per acre before sowing: 3 cwt. superphosphate, 2 cwt. sulphate of potash, 1 cwt. sulphate of ammonia.

Crops requiring principally nitrogen with a liberal supply of phosphate and a small amount of potash are cabbage, cauliflower, rhubarb, spinach, and celery. A dressing of fertilizers per acre for these crops shortly before planting would often be 4 cwt. superphosphate, 1½ cwt. sulphate of potash, 1 cwt. sulphate of ammonia, with side dressings of nitrogen later as required.

Requiring phosphates and potash with small amount of nitrogen are such crops as peas, beans, marrows, pumpkins, melons, cucumbers, and tomatoes. For these a suitable dressing per acre at this stage will often be 3 cwt. superphosphate and 2 cwt. sulphate of potash.

Prescriptions as a Guide.

These prescriptions are merely given as a guide for those with little local experience with the use of fertilizers for these crops. The experience gained should be closely watched and recorded so that adjustments can be made to meet local conditions more closely. As regards quantities, it should be remembered that 1 oz. per square yard is equal to about 2½ cwt. per acre.

Towards the end of August new spring growth will commence in most districts, and the root crops remaining in the ground, such as parsnips, &c., must be lifted and stored in a cool place before their flavour is spoiled through second growth taking place.

To stimulate the growth of the crop of spring cabbage a moderate dressing of nitrogen should be applied and lightly worked in when growth is about to commence. It will generally be advisable to repeat the dressing a few weeks later.

Where mushroom crops have been started, care is necessary to prevent the establishment of insect pests. Following the thorough cleaning of the shed, fumigation, and planting, it is necessary to use pyrethrum and derris powders or sprays at intervals of a few days to enable control of these pests to be maintained. Applications should be made when the beds are being straightened up after picking.

Small and Sundry Fruits.

The planting of hardy small and sundry fruits should now be carried out as soon as possible when the land is in condition. Such fruits are currants, gooseberries, raspberries, chestnuts, walnuts, almonds, hazelnuts; and in the warmer districts and localities figs, persimmons, mulberry, feijoa, Chinese gooseberry, and loganberries, deferring until about October the planting out of Cape gooseberries, tree tomatoes, and passion-fruit. The hardwood plants, especially, should be carefully pruned after planting so that they will grow strong and thrifty without any delay.

Manuring of Raspberries.

A report is just to hand from Long Ashton Research Station regarding an experiment carried out from 1932 to 1937. The treatments included—

(1) No manure.
(2) Farmyard manure, 10 tons.
(3) Complete organics (dried blood, bonedust, sulphate of potash).
(4) Complete inorganics (nitrate of soda, superphosphate, and sulphate of potash).
(5) Complete mixed organic and inorganic manures, as detailed above.
(6) As in No. 5, but without nitrogen.
(7) As in No. 5, but without phosphate.
(8) As in No. 5, but without potash.

In all treated plots, except those receiving 10 tons of farmyard manure, nitrogen was used at the rate of 50 lb. actual nitrogen per acre, phosphate at 120 lb. total phosphate (approximately 60 lb. phosphoric acid) per acre, and potash at 100 lb. (oxide of potassium—actual potash) per acre. The manures were applied in broadcast fashion during the spring, and the farmyard manure was not specially turned in.

Potash Deficiency Symptoms.

The growth throughout the plots was good, excepting those under potash-deficiency and to some extent those under nitrogen-deficiency. The potash-deficiency symptoms, present in plots under the first and last treatment mentioned above, were quite typical, beginning as a slight purpling and followed by brown tinting of the leaf margins, which eventually dried out, producing marginal scorch and extending later towards the midribs between the veins.

Cropping Results.

The treatments were duplicated. On Block A the crops were :—

(1) Plot 7 with 112·15 kilos.
(2) Plot 5 with 110·15 kilos.
(3) Plot 2 with 107·07 kilos.

"No manure" plot carried 79·69 kilos, and Plot 8, with potash omitted, 75·5.

On Block B the crops were :—

(1) Plot 5 with 109·99 kilos.
(2) Plot 4 with 107·23 kilos.
(3) Plot 2 with 102·86 kilos.

"No manure" plot on this block carried 50·6 kilos, and plot with potash omitted 52·48.

The increases in the crops of fruit in the two blocks due to the manures and fertilizers are, on the whole, similar to those for cane growth.

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A previous experiment on the same lines was carried out with a crop of gooseberries. The results were generally similar to those described for raspberries, potash-deficiency injury being the chief problem in both cases. Nitrogen-deficiency effects were observed with raspberries when that ingredient was omitted, but not with gooseberries.

Spraying Small Fruits.

The more common troubles here include gooseberry leaf-spot, *Mycosphaerella grossulariae*, which also affects currants. For this, an application of Bordeaux 5–4–50 should be applied when the leaves are unfolding, and repeated at about monthly intervals at a strength of 3–4–50 as required.

A "cane-blight," causing branches of gooseberries to die back, is caused by a fungus *Botryosphaeria ribis*, which also affects currants. The remedy is to cut out infected wood well beyond the point of infection and sterilize the wood. As the trouble is chiefly spread by means of insects, these should be controlled where and when necessary by light dustings of derris.

Where trouble is experienced with raspberry-cane-wilt disease, due to *Leptosphaeria coniothyrium*, the new canes should be sprayed at bud movement with Bordeaux 5–4–50 and repeated at intervals at a strength of 3–4–50.

Because of the trouble caused to strawberry crops by the leaf-spot fungus, *Mycosphaerella fragariae*, Bordeaux 3–4–50 should be applied in early spring and a good cover maintained.

To prevent the attack of the native bud-moth, *Carposina adreptella*, in districts where it is troublesome, raspberry brakes should be sprayed with arsenate of lead in the spring when growth commences.

Black-currant Eelworm.

Black-currant eelworm is causing growers anxiety in some districts by destroying the buds. The variety known as Daniel's September seems to be particularly susceptible. The insects live between the bud scales, and require the presence of films of moisture to enable them to migrate on the surface of twigs and shoots, being unable to travel on dry surfaces. Badly infested parts would be better cut out and burnt. Avoid touching healthy growth after handling infected twigs, and also avoid handling wet bushes. Cuttings for propagation should be taken only from healthy bushes. Satisfactory control has not yet been established, but constant use of lime sulphur has been recommended. It may be tried first at a strength of 1–20 before the buds begin to break, and afterwards at intervals at a strength of 1–120; or nicotine sulphate 1–400 may be used. This is a comparatively new pest, and until further trials have been made these spray formulae should be used experimentally.

In the control of disease it should be remembered that the life of these plants is about ten years, after which they should be dug out and burnt. In the meantime, new plantations should be made on fresh land. Also, in the performance of all operations the younger and healthier plantations should be dealt with first so that infection may be avoided so far as possible.

The Homestead Garden.

In the cooler localities roses are pruned towards the end of August, or even early September, with a view to delaying the new growth until the period of hard frosts is past; otherwise it is susceptible to serious injury in such localities.

Herbaceous borders requiring a periodical overhaul may now have the plants lifted and the land reconditioned before replanting. This attention is necessary at intervals of three or four years. Many excellent hardy annuals may now be sown outside and half-hardy annuals in boxes in sheltered frames. Large weeds should be removed from lawns; they will draw easily after rain if some of the main roots are cut with a long knife well below the crown.

The planting of trees and shrubs should now be done as soon as conditions permit; the end of September is about the limit for this class of work. Climbing plants newly set at the base of a wall often require watering in and attention throughout the summer to see they do not suffer from want of water. Standard trees and roses should be securely staked, setting the stake in position before planting and tying it firmly and neatly afterwards. Strips cut from cycle or motor tires make suitable ties. The tie should be placed around the tree and the end crossed before bringing them around the stake and nailing them to it with felting-nails.

Where new lawns are to be sown down, August is usually a suitable time. In dry localities it is important to sow early. The land must be in good condition for the work, and a windless period is necessary for broadcasting the seeds.

—Wm. C. Hyde, Horticulturist.

Sowing a Grass Paddock on a Wheat Crop.

In South Canterbury the practice of sowing down a grass paddock in the spring on a wheat crop is fairly general, and, contrary to expectations, the results are, in the main, good. This year, owing to the dry conditions, the wheat crops have been thin, and then with abundant rain in December and January the sown grasses and clovers have made very good growth. In one of the Fields Division wheat experiments (spring sown) grass was also sown with the crop. It was very noticeable that with varieties like Ben Cubbin, Lin Calel, and Cross 7 the grass and clover was very much better, being denser in the sward and a better colour than in the case of S.S. Tuscan and Tainui plots. Another instance bearing on the same subject, only in this case the grass was sown in the spring on an autumn-sown oat crop: There was a track through to another paddock, and on this portion the oats did not grow at all, but the grass made wonderful growth, being very dense and a rich green colour, as against the colour of grass in the portion where the oat was, it being very pale in colour and not the dense growth of the track portion.

Reseeding of Clover.

An area of subterranean clover surface-sown in the Manawatu in August has proved quite interesting. A month after sowing when the plants were still in the two-leaf stage a very dry spell was experienced, and it seemed from their withering appearance that they would not come to anything. However, despite the dry season, the clover has survived, and although many of the plants have not grown very large some have runners up to 6 in. in length and all plants have thrown some seed. From this it would appear that spring sowing of subterranean clover in this district is not a failure, but in average seasons with normal rainfall will probably allow of very good reseeding.

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Work for the Month in the Apiary.

Making a Start with Bee-keeping.

THE question is often asked : " What is the best time of the year to make a start with bees ?" There is no better time than the spring ; first, because there is little advantage to be gained in purchasing hives in the semi-dormant period, when the activities of the bees are at their lowest and little can be done by the beginner to probe the mysteries of the hive, and, secondly, because in making a start in the spring the beekeeper can immediately engage in the practical work, which, after all, is the most interesting and absorbing side of beekeeping.

Until an opportunity has been afforded to open up the hives the beginner will not be able to put to the test any knowledge he may have acquired by a course of reading. Before making a start the beginner should first become acquainted with the rudiments of the art ; in any case, he should know something of the hive and its parts, the inmates of the hive, and something of their life-history. This elementary knowledge is best obtained from some reliable text-book on the subject. There are many good books on beekeeping available, but the beginner will find much of the information he requires in a bulletin published by the Department of Agriculture entitled " Beekeeping."

Fundamental Principles.

The information contained in the bulletin should suffice to tide a person over the difficulties likely to be met during the first season and to enable him to grapple with the many problems which may have to be faced before the season is completed. Later, should he decide to extend his theoretical knowledge, he can obtain a more advanced work on the subject. However, is is well to warn the beginner that until he has grasped the rudiments of beekeeping it is a disadvantage to acquire too many conflicting opinions on the subject, as these tend to confuse, and lead to blunders and expense which could have been avoided if the advice given in some reliable text-book had been followed.

As spring is the best time to start beekeeping, no time should be lost in making the necessary arrangements for the purchase of equipment. It is immaterial whether a start is made with Italian or black bees. After all, it is a matter of cost, but if Italian bees can be purchased as cheaply as black bees it is better to start with them. In any case, start with the cheapest bees.

If bees are obtainable locally the prospective beekeeper can make arrangements for the purchase of established colonies, or he can wait until swarming-time, when swarms are available. Perhaps the most satisfactory way is to purchase some established colonies from a neighbouring beekeeper and move them home before too much brood is present in the hives. No harm will come to bees moved in the colder months, as the provision for screening is not so essential as when they are moved during the summer months. Screening the hives top and bottom is not necessary if the bees are moved only a short distance, and if the beekeeper takes the precaution of tacking a piece of wire gauze across the front entrance it will prevent suffocation and make for safe handling in transit.

Purchase only First-class Stock.

The beginner will be well advised to procure only strong, healthy colonies from a reliable beekeeper who can furnish a guarantee that the bees are healthy. Upon this depends much of his future success. The keystone to this condition is the permit issued by an Apiary Inspector under the Apiaries Act. The first question to be asked by the beginner of the seller is : " Have you the necessary permit to sell ?" If this is forthcoming, he may rest assured that he has a reasonable chance of getting clean bees, apart from any other conditions which go to make a good hive.

Although the purchase of first-class colonies is probably the most expensive way to commence beekeeping, they have the advantage of being more easily kept in order than colonies which have been neglected and which require to have corrected the faults of the previous owner who has not learned to make his beekeeping profitable.

As it cannot be expected that the beginner should know what constitutes a good colony, he should deal only with a beekeeper of some standing. Everything with bees depends upon starting properly. The possession of a colony in prime working-condition gives the beekeeper a standard with which to compare other colonies, and enables him to avoid costly mistakes in their management. If the cost of starting a small apiary has to be considered, the beginner will find it an advantage to arrange for the purchase of as many first swarms as are wanted. These may be obtained in boxes and subsequently transferred to frame hives. Only early and prime swarms should be obtained, otherwise they will not build up in time for a crop.

The Placing of Hives.

The hives, when placed in their permanent position, should be sheltered and should face the north. Protection from cold winds is important, but the hives should not be placed under trees, as this has a tendency to make the bees vicious. The hives should be set on four bricks, as this allows for a free circulation of air under the bottom-boards, which will rot if placed directly on the ground. The hives must be level crosswise and have a slight cant lengthwise. This prevents driving rains from lodging within the hives and making the combs mouldy. A watertight roof and sound bottom-boards are just as essential to the welfare of bees as are good floors and roofs in human dwellings.

A certain amount of working equipment is necessary. However, if provision is made for a smoker, bee-veil, hive-tool, and a pair of gloves, such other articles can be added as they are needed. Until such time as the beginner has got used to the stings he will find it an advantage to wear gloves, although he should accustom himself to do without them. In time gloves become impregnated with poison, and this will irritate one's flesh on hot days. Moreover, it is resented by the bees. There is much difference in the temper of bees, black being much more troublesome to handle than Italians, but with a little care in carrying out hive manipulations and the free use of smoke most colonies can be handled with very few stings.

Provision for Increase.

If the beginner desires to start with established colonies it is reasonably sure that he will have to make provision for the increase that will take place. Under normal conditions swarms are sure to issue unless the hives are manipulated to prevent them. Consequently, extra hives

and frames should be in readiness. These can be purchased in the flat and put together, so that no time will be lost when the first swarms come out.

For each swarm of bees a complete outfit will be required, consisting of one bottom-board, one body-box, one roof, ten Hoffman frames, one half-super, seven section frames, twenty-eight section, and about 2 lb. of comb foundation. Additional half-supers will be required to place on the established colonies to permit of storage room for surplus honey.

Having got together the necessary bees and equipment, the beginner can then turn his attention to the practical side of the work. Before opening up a hive everything should be in readiness. The smoker should be going well, and the operator would be well advised to protect himself with a good bee-veil properly adjusted. Attention to these details is absolutely necessary, otherwise the bees may drive him from the hive, particularly if they are bad tempered.

Proper Use of Smoke.

By the free use of smoke it is not meant that the bees should receive an over-dose, as this may demoralize them and render them liable to attack from other colonies. Moreover, it does not bring them under control, but tends to aggravate them. It has the further disadvantage that as the bees are driven from the combs they form in clusters on the bottoms of the frames and the sides of the hives, making it well-nigh impossible to locate the queen and to carry out other essential work with any degree of success.

The best fuel for the smoker is dry, clean sacking. Avoid oily waste and cotton materials, as the smoke from these articles makes the bees vicious. When handling bees, all operations are best carried out in a gentle manner, avoiding at all times quick movements and clumsy manipulations, which may crush them. It must be remembered that nothing irritates bees more than the odour of the poison which fills the air when bees are crushed.

Preliminary Examination.

With the advent of warmer weather, advantage should be taken of the fine days to make a preliminary examination of the hives. Provided that the colonies were queen-right in the autumn and had ample stores for the winter period, very little harm can come to them during the opening months of the spring. It is not sufficient, however, to conclude that all is well because the bees are flying freely and numbers of them are carrying pollen into the hives. These activities obtain even up to the point of starvation, and if taken as a guide to the condition of the hives may end in wholesale losses.

To ensure, therefore, that all is well and conditions right for their progress, a critical examination should be made as early as possible. Although it is an advantage to postpone the spring examination until the bees are working fruit-bloom and early nectar plants, if it is thought the colonies need attention the work should not on any account be delayed. It must be remembered that the drain on the stores is enormous once brood-rearing has commenced.

Manipulating Hives.

When starting to manipulate a hive, puff a little smoke in at the entrance, and, having removed the roof, puff a little more in the frames as the mat is peeled off. When this operation is complete, bring into use the hive-tool to crowd the entire set of frames to the opposite side of the hive. This has the effect of widening the space between the side of the hive and the first frame to be taken out. Then prize the first frame loose from the next one, which will leave it free to be lifted out.

The first comb to be taken out should be placed in an empty super and covered, to prevent robbing while the other combs in the hives are being examined. Next, prize the balance of the frames apart one by one prior to making an examination of the whole. As each comb is being examined and put back the operator should watch the behaviour of the bees, and if they show signs of assembling in close formation between the top bars of the frames, watching his movements, they should be driven down with a little smoke.

Household Activities.

Usually, the combs in the middle of the hive will reveal the household activities. If the hive is in normal condition the centre combs will contain brood in all stages, while at the top of the comb or in the upper corners there may be patches of sealed honey. In addition to the sealed honey there will probably be a considerable area of sealed brood. The beginner can determine the difference between honey and sealed brood by removing some of the cappings. However, with a little experience he will be able to distinguish the difference by the appearance of the cappings. In the cells adjacent to the sealed brood the older larvæ may be seen as white grubs coiled tightly against the bottom of the cells; in other cells smaller larvæ and eggs.

The eggs may be at first difficult to detect, but by holding the comb in the right light they are easily distinguished on the bottom of the cells. In appearance they are white, and resemble small pieces of cotton about $\frac{1}{16}$ in. in length. Usually, between the brood and the honey may be found several rows of cells containing pollen. This appears usually as yellow-brown or blue material packed in the cells. It is gathered from flowers, and is used in abundance throughout the breeding season in elaborating the food for the young bees while in the larval stage.

Uniting of Colonies.

If, however, the absence of brood and eggs is noted the indications are that there is a poor queen or that the hive is queenless. To attempt to carry such colonies through the spring months will lead to serious trouble, as they stand in danger of being robbed out. It is a far better plan to unite such colonies than to run the risk of disturbing the whole apiary.

A simple method of disposing of weak and queenless hives is to unite them with strong ones, and this may be carried out by placing a sheet of newspaper over a strong colony and putting the hive to be united on the top of the paper. In the course of a day or two the hive may be examined to see that the colonies have united. Should the paper be intact it must be torn in several places, when it will be found in the course of a few days that the colonies are working peaceably.

It is essential that breeding should be kept steadily going, so that the colonies will be strong in young bees to take advantage of the first flow of nectar. Food and warmth are important factors in inducing breeding, and these must have the constant attention of the beekeeper during the spring months.

Critical Period of Year.

As already indicated, the spring is the most critical period of the year for the beekeeper, and the success or otherwise of the season's work will depend almost entirely upon his efforts to guard against the losses attendant upon starvation. When breeding is in full swing a considerable amount of food is used up daily for feeding the brood, and, unless the weather conditions are favourable to enable the bees to work the early spring blossoms it is essential that the food-supply be augmented.

The amount of nectar gathered when the weather is favourable, in conjunction with their stores, will tide the bees over long periods, but, if bad weather follows, colonies will often be reduced to a state of starvation before the owner is aware of their condition. If, on examination, a colony is found with insufficient stores to meet requirements, preparation should be made to feed at once. It is not a safe policy to keep a colony at starvation-point, as this will prevent the rearing of a succession of young bees to take the place of the rapidly dwindling number of workers at this period.

—E. A. Earp, Senior Apiary Instructor, Wellington.

Poultry-keeping Section.

Care During Incubation Period.

THE aim of every poultry-keeper should be to breed a flock of birds which will produce not only a good number of eggs but also eggs of good size, shape, colour, and texture of shell. In order to bring about this desired result every care must be taken in the selection of eggs for incubation purposes. This careful selection should continue year after year, for permanent improvement cannot be expected from one year's selection.

Judging from eggs sent to the export depots during the last year or so, there is a tendency for the average size of eggs from some producers' plants to be smaller and shell-texture poorer than was the case some years ago.

This would indicate that more care is necessary in regard to selection.

Numerous Complaints.

During the past late summer more complaints were voiced by consumers regarding the poor shell-texture of eggs than has been the case for many years. This defect may, to some extent, have been due to the long, warm summer and the fact that many hens continued to lay later into the autumn than usual. Such happenings, however, should be taken as a warning and every endeavour made during the next few months to see that only eggs of good size, shape, and texture of shell are used for incubation purposes.

Our egg-laying competitions are doing a most useful service for the industry, and they have been the best advertising medium for the successful competitions. However, those requiring fresh blood would be wise to study the judging results of the eggs laid by the various breeders' birds before deciding from where fresh blood is to be procured. It would not be wise to introduce fresh blood from a strain simply because of the number of 2 oz. eggs produced, but it would be advisable to make sure that such eggs were of good shape, colour, and of sound shell-texture.

Holding Eggs for Incubation.

The germ-cell of a fertile egg is fertilized by the male element just before the yolk enters the oviduct, and the development of the embryo really begins from that time and continues during the passage of the eggs through the oviduct, which usually takes about twenty hours. Thus, when a fertile egg is laid a certain amount of development has taken place, and this development is suspended if eggs are held in a temperature below 69° F.

Investigators have shown that if eggs are held for any length of time in a temperature below 28° F. they are likely to be chilled and will not hatch well. It has also been shown that if eggs have to be held for incubation they should be held in a temperature where there is likely to be a cessation of the development which was under way before they were laid.

If possible, it is advisable to keep eggs in a temperature between 50° and 60° F. or in as even a temperature as possible, and it is well to remember that there is a danger in holding them in too warm a place. On very cold nights it is advisable to cover them in order to avoid their becoming chilled. The sooner eggs are set the better, as satisfactory results can hardly be expected after they are ten days old.

When eggs are being held it is advisable to turn them each day in order to prevent the yolk from coming into contact with the shell-membrane.

Management of Incubators.

The manufacturers of incubators usually send out a set of instructions with each machine, and these should be carefully studied and followed closely. The place where the machine is operated often has much to do with the results obtained.

A good incubator-room is not subject to great changes of temperature, and is so ventilated that the heavy gases near the floor can escape. Ventilation is also arranged near the roof, so that the lighter gases may get away. Care should be taken to see that the sun is not allowed to strike in on the incubators.

Set the Machines Level.

In order to prevent any part of the egg-chamber being much warmer than another care should be taken to see that all machines are set level. This can be done with a carpenter's level, and it is well to ensure that it is level from side to side as well as from back to front.

The Lamp.

As so much depends upon a regular supply of heat, the lamp needs careful and regular attention. First of all, see that plenty of length of wick is provided. This should fit well and burn with a round flame, not pointed at the corners. Once the wick is properly trimmed it should not be cut. Each day any char should be removed, and if the flame is not burning as desired a little pressure with the fingers on the high points should correct matters.

The gauze around the burner should be examined and cleaned regularly, for if this becomes covered with dust or fluff insufficient air will reach the flame to enable it to burn brightly.

Only the best oil should be used, and care should be taken to see that the lamp is not filled too full, for if this is done it will not burn well, and if oil flows over the bowl it is likely to cause fumes and, perhaps, smoking. At times there is a tendency for the flame to draw up as the heater becomes warmer, and for this reason it is a good plan to clean and fill the lamp in the morning, so that the flame may be watched. Machines should be heated up gradually, and the thumb-screw of the regulator can be slightly tightened or loosened until the machine is steady at the desired temperature.

Place the Thermometers Correctly.

Care should be taken to ensure that the thermometers are placed in a position as recommended by the manufacturer, and it is a good plan to have more than one thermometer in each machine.

Moisture and Ventilation.

A correct supply of moisture and ventilation is very important, but as so much depends upon local conditions no hard-and-fast rule can be set down.

The air-cells should be studied, and if at a given time the air-cells are not large enough a little less moisture and a little more ventilation should be tried.

On the other hand, if the average size of the air-cells is too large a little more moisture may be added.

Where results have not been satisfactory, but the temperature correct and the eggs not chilled, it may be advisable to increase slightly the amount of ventilation and also the moisture-supply, especially during the last few days. It is a good idea to set a hen at the same time as the incubator and to try and keep the size of the air-cells in the machine-eggs similar to those under the hen. It will be noticed that the air-cells will vary somewhat, but one must strike an average.

Turning the Eggs.

It may be said that one of the changes that has taken place during the last few years in regard to the management of eggs during incubation is the tendency to increase the amount of turning and to cool less. Quite a few manufacturers recommend turning three times a day after the first week. By turning it is not meant that each egg should be turned exactly over. If a few are removed from the centre of the tray the rest can be gently shuffled round and those from the centre replaced on the edge of the tray.

If the temperature has been correct and the eggs not chilled the hatch should be over by the end of the twenty-first day. When a hatch is over before time it usually indicates that the temperature has been rather high. On the other hand, if the hatch is late it indicates that not quite sufficient heat has been applied. The nearer the hatch is completed up to time the better.

When a hatch is over it is advisable to open the door of the machine just a little in order to lower the temperature of the chamber to about 95° F. and to allow the chicks to harden off before being placed under the hover or in the brooder.

The brooder should be heated up a day or so before the chickens are expected so that everything will be ready. Every care should be taken to see that they do not get a chill while being transferred from the incubator to the brooder.

Feeding the Chickens.

There are many different methods of feeding chickens, and the following is one that has been used with success at the Wallaceville Poultry Station.

Chicks are transferred from the incubators to the brooders at night-time.

First Meal.

On the following morning, usually about forty-eight hours after hatching, they are given their first meal. This consists of a grain-mixture, which is fed during the first seven days, and is made up as follows :—

Finely-cracked wheat ..	75 lb.
Finely-cracked maize ..	25 lb.
Total	100 lb.

This mixture is apportioned daily in suitable quantities according to the number of chicks to be fed and to how they are eating. For the first two days the chicks are fed every two hours, or until they are eating well, after which three meals per day are given, the first at 7.30 a.m., the second at 11.30 a.m., and the evening meal at 4.30 p.m.

The quantity of the mixture which is intended to be given for each meal is first prepared by being soaked in water about an hour before feeding-time. The grains are allowed to absorb just sufficient moisture to cause them to swell.

Grit.

A little finely-cracked oyster-shell grit is mixed with their food from the first day until about the eighth day. From then on finely-cracked oyster-shell grit is placed in open hoppers or boxes to which the chicks have free access at all times.

Water and Milk.

At the same time as the first meal is given the chicks are provided with water to drink. When the chicks are four days old fresh or skim milk is provided. While milk is being supplied water is not provided, the milk being given alone as a drink until the chicks are old enough to go away from the heat. This, generally speaking, is when they are from six to eight weeks old, according to weather conditions.

After the chicks have been transferred from the brooder to colony houses water is always kept within easy reach, but so long as an ample supply of milk is available the latter would still be used.

Green-food.

On the fourth day green-food—silver beet and young green oats, finely cut up—is fed together with the other rations. When it is observed that the chicks are consuming the green-food a regular supply is provided and is fed separately between meal hours, at 9 a.m., 2 p.m., and again after the last meal, at 5 p.m.

Mash.

Commencing on the eighth day after hatching, the chicks are given two mash-meals and one meal of grain per day. The grain-mixture remains the same as during the first week, but the grains used are a little larger each week, according to the development of the birds.

The mash-mixture consists of one measure of wheatmeal to one measure of bran. This is moistened with sour milk, and every care is taken when mixing to produce it in as crumbly a condition as possible and not too pasty or sloppy. If milk is not available 2 per cent. of meat-meal is included in the mash ration from the eighth day, and the mash is moistened with water.

No material change is then made in the diet until the age of eight weeks is reached. At this stage, and provided the chicks have done well, they should be big enough to be given whole grain, with the exception of maize, which is a little too large.

Young Stock (from Eight Weeks).

The following are the grain and mash mixtures fed from the age of eight weeks until the birds are approximately six months old :—

Grain Mixture.	*Mash Mixture.*
4 parts wheat.	2 parts wheatmeal.
2 parts shelled oats.	1 part pollard.
1 part kibbled maize.	3 parts bran.

Sometimes it is seen, however, that at the age of three and a half to four months the chicks are maturing too quickly. To check this the milk is eliminated from both the mash mixture and as a drink, water being substituted. Further, it is sometimes essential to eliminate the mash itself as well as the milk, grains only being fed until the birds are well developed.

—C. J. C. Cussen, Chief Poultry Instructor, Wellington.

Some remarkable wheat yields, considering the season, have been produced on the heavy land in the Marlborough district. The early part of the season was very dry, and this in many cases caused a drop in yield. However, at Stoney Creek a yield of 81 bushels of Cross 7 was obtained, while others of 78 bushels and 72 bushels showed that this performance was not a freak. These figures are, of course, some of the highest yields, but, generally speaking, the average this year is high—on the heavy land, about 40 bushels to 45 bushels.

Grain crops in Central Otago suffered more or less severely from the very dry conditions experienced in the spring and early summer. Most of the autumn-sown crops stood up to the adverse conditions well and were practically all harvested, while the spring-sown areas dried out or were fed off. The few crops that could be irrigated produced heavy yields.

N.Z. Federation of Young Farmers' Clubs.

Edited by S. Freeman, Dominion Organizing Secretary.

Wairarapa Club's Educational Tour.

N. LAMONT, District Secretary, Masterton.

AUGURING well for the good time to come, an excellent start was made by the Wairarapa Club on an educational tour on 23rd May. A quick lunch at Woodville, arranged with the help of the local club, and we were through the Gorge and on our way. It was our object to get as far from home as possible in the first day, and no further stops were made until we reached Ohakune. Good time was made through the Manawatu and Rangitikei districts, but the steep country around Taihape slowed down the bus.

We were promptly on the road next morning for Rotorua. Unfortunately, low clouds obscured the National Park mountains, and for a start a rather dreary route was followed through tussock and scrub country. Just before lunch we received our first introduction to the development methods employed on pumice country, when we visited the Rangipo Prison Farm. Under the guidance of Mr. Banks, officer in charge, we saw rabbit-infested country in various stages of development up to really good permanent pasture. Although delayed by narrow bridges, we had sufficient daylight left to see the vast expanse of Taupo and to be impressed by the colour and turbulence of the Huka Falls before travelling through miles of pine plantations for Rotorua, which we reached at about 6.30 p.m.

Sight-seeing at Rotorua.

The following morning was spent in sight-seeing with Guide Rangi at Whaka. Before lunch the Fairy Springs, with their innumerable trout, were visited, followed by a tour through the picturesque sanitorium grounds. The afternoon's visit to the Guthrie, Ngakuru, and Horohoro districts was one of the high-lights of the trip. The conversion of this pumice country from manuka, fern, and tutu into excellent dairying-pasture greatly impressed the party, as also did the warm welcome extended by the Maori Young Farmers' Club.

The party from the Wairarapa Young Farmers' Clubs photographed with Guide Rangi at Rotorua during the North Island tour.

In welcoming our party, Chief Ruhi and Mr. G. Kapene gave an interesting account of the growth of the Native development schemes initiated by Sir Apirama Ngata in 1930, and one could not but greatly admire the industry of the Maoris and the foresight of those responsible for the direction of the work. A colourful outline of local history by Chief Ruhi and an action song by the women concluded a very pleasant visit. Returning to Rotorua for the evening, the majority of the party visited the Blue Bath.

On the following morning we bade farewell to our guide, Mr. C. S. Dalgliesh, of the Department of Agriculture, Rotorua, and set out for Paengaroa, visiting the Okere Falls *en route*. A most hospitable welcome awaited us at Paengaroa. Lunch was provided by local club members, who also entertained the majority of the party at a dance specially held in their honour.

An insight was gained into what pig-keeping on a large scale can mean when the Ross Bros.' piggeries were visited during the afternoon. Equally impressive were the dimensions of the piggeries, the efficiency of planning, and the scrupulous cleanliness maintained.

Novel Excursion.

After a night at Tauranga a novel excursion was provided by the local club when we were taken down the harbour by launch to Omokoroa Point. Here lunch had been prepared, and it was followed by a number of sports items. A Wairarapa team won the tug-of-war, and Jock Mackay, of Masterton, won the high jump. The honours went to local members in the shot-put and the hop, step, and jump. Mr. C. Walker, of the Department of Agriculture, Tauranga, merits our thanks for the trouble he took to make our visit enjoyable. While at Tauranga an opportunity was taken to visit the Gate Pa and the Soldiers Cemetery, where an early settler of the district gave a vivid account of the actions that had taken place in the neighbourhood

From the Bay of Plenty our next stop was made at Te Aroha, where Mr. Shepherd, of Hamilton, took over the conducting of the party. Something novel in the way of lime-works was seen at the Kopu plant, where the source of the material is a deposit of shell covering an area of 34 acres to a depth of 2 ft. to 14 ft.

Although it was understood that weather conditions had been unusually favourable, the amount of the grass-growth in this district greatly impressed the tourists, as it compared easily with the spring flush of the best in the Wairarapa. The other side of the picture was seen, however, when a brief inspection was made of the swamp-drainage methods necessary and when the difficulties encountered in rearing young stock on the swamp were discussed with local farmers. A visit of more than usual interest was that to Mr. McLean's pampas-grass areas at Pipiroa. There is no question that Mr. McLean's returns are most impressive, and, even if less outstanding results can be expected in the Wairarapa, this plant could be most useful once the difficulties of establishment are overcome. After being entertained to afternoon tea by the Mangatawhiri Club we left for Auckland, arriving for dinner on the Saturday evening. The Sunday was taken up by seeing the sights of the city.

First Bad Weather.

On Monday morning we encountered the only bad weather on the whole journey, but, fortunately, the greater part of the time was spent under cover at the Challenge Phosphate works. Here, the intricate processes were explained, leading up to the manufacture of sulphuric acid and its use to convert raw rock phosphate into superphosphate. A visit was made to the Te Kauwhata Experimental Farm, but was cut short by heavy rain. Fortunately, the weather cleared while we were on the way to the Tatara Park Friesian farm, where an opportunity was taken to view some of the best stock in the Friesian world.

On the following day the Ruakura Experimental Farm was visited, where Mr. Rodda, the manager, gave the party an interesting outline of the experimental work that is being undertaken on such matters as facial eczema, bull sterility, pig-feeding, top-dressing, &c. During the afternoon the party was conducted over the Arapuni hydro-electric power-house, and inspected the huge dam and spillway which have been constructed there.

These two days, spent in probably one of the richest dairying districts in the world, were a great education to those passing through for the first time. To Wairarapa eyes the pastures and pasture growth were nothing less than amazing. Although much was heard of it, very little facial eczema was seen, the majority of affected stock having, of course, been disposed of; but there is no question that the sheep seen generally in the Waikato did not compare favourably with those of the Wairarapa. The country is undoubtedly dairying-land, and cannot raise as healthy sheep as the lighter, drier country of our end of the island.

Homeward Journey.

From this point onwards we were really on our way home. Leaving Cambridge on the morning following our visit to Arapuni, we made good time to Waitomo. Here the Waitomo Cave was visited. None will readily forget the impressive eeriness of the boat journey through the glow-worm grotto, when nothing was heard but the lapping of the water and no light showed but the weird gleam of the myriads of glow-worms. This visit was the last of the tour, and after lunch at Te Kuiti we travelled straight to New Plymouth, where we encountered the Manawatu party, but, unfortunately, our late arrival prevented us from making close contact with them. The next morning saw us on the journey back to the Wairarapa.

There is no question that the trip was all that could have been desired. In the fourteen hundred miles covered every type of farming country was seen, from the poorest of the poor to the richest dairying country in the Dominion. It was an educational and social experience second to none.

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Educational Week at Waitaki Boys' High School.

S. H. Saxby, District Secretary, Dunedin.

FOR a week during May fifty young farmers from many parts of Otago, Southland, and South Canterbury were in residence at the Waitaki Boys' High School to attend an educational course arranged by the Dunedin and North Otago District Committees. The success of the course was in no small measure due to the generosity of the Waitaki High School Board, which made available to the party all the excellent buildings and facilities of the school.

The course itself consisted of a well-balanced series of lectures, tours, and visits to various places of interest in and near Oamaru.

Official Opening.

Although timed to commence at 11 a.m. on Monday, 16th May, many members were in residence the previous night. At the official opening, which was held in the Hall of Memories, Mr. J. M. Smith, Fields Superintendent, Department of Agriculture, who was in charge of the party, extended a welcome and expressed the hope that the course, which had been made as practical as possible, would be both enjoyable and of educational value. Other speakers were the Mayor, the President of the North Otago Farmers' Union, the Organizing Secretary of the N.Z. Federation of Young Farmers' Clubs, and a representative of the Waitaki High School Board of Governors.

Following the official opening, Mr. B. B. Blackmore conducted the party through the school buildings and pointed out the many features of interest.

In the afternoon a cattle-judging competition was held. This was won by Mr. K. McCaw, of Lawrence. Following this, Mr. R. Portis gave an instructive demonstration on some dairy cows.

Professor Hudson, of Lincoln College, then gave an hour's talk, dealing with many aspects of farm management. The evening was devoted to the screening of a travel film by Dr. Burns, also of Lincoln College. Much of this film was in natural colour and showed up vividly the many and varied tints and shades of some of the show places in America.

Lecture on Wheat Research.

The programme next day began with an interesting lecture on "Wheat Research" by Dr. Hilgendorf, of the Wheat Research Institute. He traced the history of wheat-growing in New Zealand, and followed this by indicating the various varieties that were suitable to the wheat-growing districts. It was pointed out that the testing of new wheats was the function of the Department of Agriculture and the Wheat Research Institute. The trial of new, untested wheats by farmers was to be discouraged, said Dr. Hilgendorf, as they were inclined to give them too good a treatment, resulting in higher yields than they would normally obtain. Disappointment was sure to follow when they were later grown under normal conditions.

Group taken at the Waitaki Educational week.

Following this lecture a horse-judging competition was held, the winner being I. D. Kingan, of Five Forks. Mr. J. Tisdall gave an excellent demonstration on the points to be taken into consideration when evaluating or judging a Clydesdale horse.

The party then assembled at the front of the buildings, where Dr. Hilgendorf again took charge for an hour. This was spent in a tour of the grounds, during which he discussed many subjects, ranging from earthworms to oak-trees. This type of informal lecture was greatly appreciated.

Irrigation Scheme inspected.

The entire afternoon was spent in a tour by bus of the Redcliffs Irrigation Scheme, under the direction of Mr. W. C. Stafford, Irrigation Officer to the Department of Agriculture. Various types of irrigation, such as the contour and border dyke, were seen. It was pointed out that Canterbury irrigation differed in several important respects from irrigation in Central Otago. In the latter area irrigation was essential if anything at all was to be grown, said Mr. Stafford, whereas in Canterbury irrigation merely supplemented the ordinary supply of moisture, thus ensuring a crop. An additional advantage to Canterbury was its excellent and continuous water-supply from the rivers, which eliminated the necessity of building costly dams.

In the evening Mr. R. B. Tennent, Director of the Fields Division, Department of Agriculture, addressed the party on the Young Farmers' Club movement in New Zealand. Although the movement is still in its infancy, said Mr. Tennent, he was sure that it would spread until all young farmers were members. The social contacts they made and the information they received would always stand them in good stead. The latest device brought out by the Department for educational purposes for young farmers was the talking picture. In the past, information had been given by lectures, field-days, and personal contacts. It was now realized that the talking picture would be a very useful means of disseminating knowledge, and it was intended to show films taken both abroad and in New Zealand. Following the showing of a silent film, Mr. Tennent explained to the party the way in which the talking films are made and reproduced.

Visits to Industries.

The next day was spent visiting various industries in and about Oamaru. The whole morning was spent in a tour of the Pukeuri Freezing-works, where Mr. S. Hook, Department of Agriculture, gave

a practical demonstration on the subject of meat inspection. A number of reject carcasses had been held for this purpose, and these, with Mr. Hook's explanations, made clear to those present the various reasons for rejection. It was pointed out that the farmer could do much to assist by the proper handling of sheep before they reached the works. When Mr. Hook had concluded his demonstration the party was conducted over the works and saw the sheep from the time they were led on to the board by the decoys to the time they emerged as frozen carcasses, blood-and-bone, or some other by-product.

The first part of the afternoon was taken up with a visit to the Oamaru Woollen-mills, where the visitors saw the processes from the time the wool was sorted and scoured until it emerged as a blanket or a piece of suiting material. The spinning was of great interest, as this gave a glimpse of the meaning of the term "spinning count," and showed why a 52 is a better spinning wool than a 32. The combing process created much interest, and the intricacies of pattern forming and weaving were the basis of much comment.

The next call was at the implement-works of Mr. E. Reid, where, among many interesting features seen, was the striking contrast of the old and the new methods of metal-working. On one side was the proud old smithy with his furnace, tongs, and anvil, welding and bending his iron; on the other side was the younger generation, with his goggles and oxy-acetylene torch, which he used both to join iron by a welding-torch and to cut iron with same torch.

Thursday's Programme.

Thursday was another full day. In the morning Mr. N. Macdonald gave a demonstration on pigs, in which he surveyed successful methods of pig husbandry and dealt with matters such as breeding, feeding, and housing. The various points to be aimed at in the production of baconers and porkers were also considered.

Two lectures on live-stock ailments were given by Messrs. C. V. Dayus and H. Doyle, of the Department of Agriculture. The subjects were "Foot-and-mouth Disease in Europe" and "Tuberculosis." Mr. Dayus pointed out that, although much was said and written about disease in New Zealand, one had to remember that the country was fortunately free from many of the most serious diseases of live-stock, such as anthrax, glanders, swine-fever, and foot-and-mouth disease. Mr. Dayus also laid emphasis on the relationship between animal health and intensive farming, pointing out that with the question of breeding for production so much in the foreground resistance to disease and constitution were apt to be overlooked to some extent.

Demonstrations on Farm.

In the afternoon the party boarded the buses and set off for Papakaio, where they were the guests of Mr. A. C. Hurst, who showed them over his well-appointed and well-kept farm. Mr. Hurst dealt with practically every aspect of farm-management, and included, by practical demonstrations, his experiences with various pasture mixtures, soil preparations, irrigation, and root-crop growing. A new foot-rot bath designed by Mr. Hurst created much interest, in that the method was not only new, but also appeared to eliminate much of the fouling of the troughs and consequent inefficiency which is only too common in the ordinary foot-rot baths. Mr. Hurst concluded the visit with an interesting discourse on the more important and interesting geological features of the district.

Friday, the last day of the Educational Week, was another day of varied subjects and interests. In the morning the party travelled to town, where they were shown over a modern seed-dressing plant by Mr. H. McDowell. From the farmers' viewpoint much was learnt. Many farmers do not fully appreciate the amount of thought and time that is required in order to transform mill-dressed seed of varying degrees of impurity into a high-grade class of seed.

The "Matakana" was in port loading frozen meat, and through the courtesy of the agents the party spent an interesting hour in examining the work that was going on, both with regard to the loading of the meat and the preparation of the holds for further cargo.

Series of Lectures.

The afternoon was devoted to lectures. The first was by Mr. J. O. Wallace, of the Department of Agriculture, who gave an instructive lantern lecture on "Potato-growing." He emphasized the fact that although a seed potato may appear perfectly sound and healthy it might be a carrier of yield-reducing virus disease. Following this, Mr. Wallace dealt with the various diseases and then with the certification scheme, which was conducted with the object of guaranteeing to merchants and growers high-grade disease-free and rogue-free varieties of potatoes.

The second talk was by Mr. W. R. Lobb, also of the Department of Agriculture. Mr. Lobb spoke on "The Control of Insect and Plant Pests." There are several methods of control—for example, biological, cultural, and chemical. The relative values of the methods were fully discussed, a large number being illustrated by lantern-slides.

The final item in the programme was a pasture-plant-identification competition. Some thirty mounted specimens were pinned up on the walls, and competitors were asked to put a name to as many as possible. This was more difficult than anticipated, and high scores were not registered. The winner was D. McLeod, of Pleasant Point.

The value of the course does not or should not end when the course ends; it should give food for thought and reflection. From remarks that have since been made by some of those that attended the course it was well worth while. Catering arrangements were in excellent hands, and the food was good and ample.

Inter-club Football Match in Otago.

AN interesting football match took place at Roxburgh, Central Otago, recently, between teams representing the Roxburgh and Moa Flat Clubs. The match was well attended by supporters of both teams and also visitors from other clubs.

An exhibition of very fine football was given in the first half of the match, and some very good forward work and neat handling of the ball was seen. The game slowed up somewhat in the second half, which was understandable, as the match was the first of the season.

The game concluded with Roxburgh twelve points and Moa Point three points. For Roxburgh, W. Macpherson and M. Dunlay each scored a try, and penalty goals were kicked by A. Bain and H. Kinston. N. Paul scored the only try for Moa Flat.

The visitors were entertained to dinner at the Grand Hotel, Roxburgh, and during the social evening which followed Mr. R. T. Kinaston presented the silver cup he had donated to the winning team. He expressed the hope that the match would be the forerunner to many others, and would thus help to foster the social side of the Y.F.C. activities.

On most soil types in North Auckland lime is necessary to obtain good results from phosphates, and it has been very noticeable this autumn that a large amount of lime is being used in conjunction with phosphates for top-dressing. A fair quantity of slag has been used, but super and lime appears to be favoured more than slag.

South Otago Clubs' Combined Field Day.

A. F. GREENALL, District Secretary, Balclutha.

MUCH interest centred around the instructive field-day which was held by the South Otago Young Farmers' Clubs on 26th April.

The party, consisting of club members and interested farmers, assembled at the Milburn Lime and Cement Co.'s Works, Milburn, at 8.45 a.m., when Mr. A. F. Greenall, hon. secretary of the South Otago District Committee, introduced Mr. J. M. Smith, of the Department of Agriculture, Dunedin, as leader of the party. Mr. Smith welcomed those assembled, and then introduced Mr. Mackersy, works-manager, who conducted the party over the works.

The party then proceeded to Mr. Jas. Lockhart's farm, Moneymore, where Mrs. Lockhart and Mrs. Allen provided morning tea. Mr. Rutherford, of the Stirling Club, thanked them for their hospitality. Mr. Jas. Lockhart then gave a demonstration on Romney, Border Leicester, and half-bred sheep. Mr. J. Walker, of the Lawrence Club, in thanking Mr. Lockhart, commented on the excellence of the demonstration.

Demonstration on Horses.

The party then visited Mr. R. Lockhart's farm, "Meadowbank," at Clarksville, where Mr. Lockhart demonstrated on Clydesdale horses. In his opening remarks he commented on the utility of such field-days, and complimented the club members on the enthusiasm with which they were tackling the problem of fitting themselves for their future vocation as farmers. Mr. F. Bishop, of the Clutha Valley Club, thanked Mr. Lockhart for his instructive talk. Lunch was then provided by Mrs. Lockhart, Mrs. Courtier, and members of the Milton Women's Division.

After lunch, Mr. C. V. Dayus, M.R.C.V.S., of the Department of Agriculture, demonstrated the method of vaccination of ewes for controlling pulpy kidney in lambs. All were impressed by the simplicity and rapidity of the method of injection and its application to farm conditions. Mr. McNoe, of the Lawrence Club, thanked Mr. Dayus on behalf of club members.

The party then visited Mr. J. Lockhead's farm at Kaitangata, where Mr. Lockhead conducted the party over the whole farm. All were impressed by the excellence of the pastures and root and fodder crops, the quality of the sheep, and the lay-out and well-kept appearance of the farm as a whole. Mr. Turnbull, of Clinton Club, thanked Mr. Lockhead for his generosity.

Lunch-time at Mr. Lockhart's homestead.

Potato-growing Examined.

A visit was next paid to Mr. A. Anderson's farm, Stirling, where afternoon tea was provided by Mrs. Anderson. Mr. Anderson then demonstrated the working of a power-driven potato-digger, and outlined his cultivation practice. Mr. J. O. Wallace, of the Department of Agriculture, Dunedin, described virus and other diseases of potatoes, touching on many important factors of production of high yields of high-quality potatoes. He also demonstrated the method of grading seed potatoes under the potato-certification scheme. Mr. J. Stewart, of the Milton Club, thanked Mr. Anderson for his demonstration, and Mr. Wallace for his instructive advice.

Through lack of time it was found impossible to visit Mr. J. G. Weir's farm to hear Mr. G. Reid's demonstration on light horses, but it is hoped that at some future date such a visit will eventuate. At the conclusion of the day votes of thanks were passed to Mr. Smith for his capable leadership of the party, to the various demonstrators, to those who had provided lunch and morning and afternoon teas, and to Mr. S. H. Saxby, of the Department of Agriculture, Dunedin, who handled the organization.

Social and Dance.

At 6 p.m. tea was held in St. Mark's Hall, Balclutha, about forty-five club members being present. Mr. Greenall thanked the members of the field-day executive of the District Committee—Mr. A. Bell, Mr. Lockhart, and Mr. J. Walker—for their assistance, the various club secretaries who had made the arrangements for members to be present, and finally the individual members of clubs who had attended the field-day. Mr. A. Bell, Stirling Club, Mr. J. Stewart, Milton Club, Mr. Corbet, Clinton Club, and Mr. Crump, Lawrence Club, expressed the appreciation of their respective clubs to all who had assisted during the day. Mr. G. Reid, of the Department of Agriculture, Balclutha, offered encouragement and assistance to the various clubs, and expressed a desire to hold many such field-days in future. Mr. A. Pannett, of the Clutha Valley, proposed a vote of thanks to Mrs. G. Reid, Mrs. Moncur, Mrs. A. Campbell, and Miss Harvey, who prepared and served the tea.

An enjoyable social and dance was held in St. Mark's Hall in the evening. Mr. P. Fahey, of Lawrence, and Mr. Lockhart were joint M.C.'s. Mr. Garfield Anderson, chairman of the South Otago District Committee, addressed members during the interval. Items were contributed by Messrs. Crump and McCaw, of Waitahuna, Mr. Rose, and Miss V. Murray. Miss I. Murray was the accompanist.

The Executive wishes to thank all who attended, Mrs. R. Christie, Te Houha, Miss E. Harvey, and all who assisted with the supper, and to extend an invitation for all in South Otago to continue taking an interest in the Young Farmers' Club movement.

Part Played by Young Farmers' Clubs in "Cavalcade of Agriculture."

THE Manawatu District Committee's main project for the year was the arrangement of People's Day at the National Dairy Show, Palmerston North, and the provision of entertainment throughout the whole day for the many visitors. The venture was an unqualified success, and has earned congratulations and praise from all quarters. The highlight of the day was the Cavalcade of Agriculture, which depicted the changes in farm implements, tractors, and transport from New Zealand's earliest agricultural days up to the present time. The amount of material that was collected and gathered together through the clubs and other sources was truly remarkable. There were about one hundred implements in the procession, which formed a double line around the oval at the showgrounds.

Splendid Exhibition.

The Cavalcade of Agriculture is described elsewhere in the *Journal* by Mr. W. J. Croucher, one of the farmer friends of the Y.F.C. movement, so that it is unnecessary to give further details. The parade following the cavalcade was of particular interest, for it comprised more than two hundred footballers, one hundred members of the Junior Women's Division of the Farmers' Union, and finally more than five hundred Young Farmers' Club members from the Manawatu and surrounding districts. The final scene, with a line of young men and women, six deep, stretching from end to end of the Show arena in the midst of the display of old and new farming machinery gave a splendid exhibition of the strength of the Y.F.C. movement in the Manawatu.

At this stage the Minister of Internal Affairs, the Hon. W. E. Parry, was introduced by Mr. E. J. Fawcett, Acting Director-General of Agriculture. The Minister congratulated the club members and officers on their achievement, and spoke at length on the value of the Cavalcade of Agriculture.

Football Tournament.

Throughout the day a seven-a-side football tournament was played. There were thirty-two teams in the competition, and some closely contested games resulted. In the final, which was played after the parade, the Marton A team won a very well-fought game against Rangiwahia, thus gaining the right to hold the "Golden Rooster" for the season. Prior to the final an amusing burlesque football match was staged by members of the Levin Club.

The Manawatu Club's football trophy, which was won by the Marton Club.

In the evening a successful dance was held in conjunction with the Manawatu Jersey Breeders' Club. Approximately five hundred attended this function, which brought to a close what has been so far the most important day in the history of the movement in the Manawatu.

Y.F.C. Stall.

During the five days' progress of the National Dairy Show a Young Farmers' Club stall was much in evidence in the Produce Hall. The exhibit, which was entitled "What Interests Us Young Farmers," included a series of practical farming subjects, such as crop diseases, wool faults, shearing, strains in pasture-plants, seed values, and carcasses of pork, bacon, and lamb. This stall created considerable interest, and attracted the attention of the majority of the visitors.

The whole of the Y.F.C. effort at the Palmerston North Show has been productive of much publicity and interest, and it may be said that attention has been closely focused on the movement not only in the Manawatu district, but over the whole of the Dominion. On this account, the Manawatu District Committee deserves the thanks of the whole of the organization.

Among the Clubs: Reports on Activities.

Western Southland.

Lochiel.—Address by Mr. Kemp on "Farming in the Orkney Islands."

Thornbury.—Lecture by Mr. A. Stuart, Department of Agriculture, on "The Identification of Grasses and Clovers." At the previous meeting an address on debating was given by Mr. R. Buchan. At the meeting before that, club members gave short addresses as follows: "Moose and Wapiti" (G. Buchanan); "Mastitis" (J. Ronald); "Balance" (J. McLean). A challenge to a debate with the Woodlands Club was accepted, the subject to be "That an Immigration Scheme would Greatly Benefit New Zealand."

Woodlands.—Talk by Mr. E. S. W. Thomas on "Some Aspects of Psychology affecting Young Farmers." A club member, K. Maxwell, gave an account of the educational week at Waitaki.

Eastern Southland.

Crookston.—Arrangements made for a debating contest with Moa Flat Club. At a meeting held on 14th June members of the W.D.F.U., the Moa Flat Club, and residents of the district were present, making the total attendance up to 69. Mr. F. L. Nicholson, of Balclutha, gave an interesting address on his recent tour abroad, illustrating his talk by moving pictures. A field-day was held at Gore and Mataura, there being an attendance of 18. Members were shown through the Mataura Freezing-works and the paper-mills. At Gore an inspection was made of Messrs. Wright Stephenson's seed-cleaning plant, Mr. W. Faithful, Department of Agriculture, being in charge of the party.

Otama.—Talk by Mr. H. Quillan, of Gore, on the R.S.A. trip to Australia and the Anzac Day ceremonies in Sydney. J. Brand, a club member, reported on the educational week at Waitaki.

South Otago.

Clinton.—Arrangements made for a social and dance; lecture by Mr. A. F. Greenall, Department of Agriculture, on "The Growing of Swedes."

Stirling.—Short talk by Mr. A. F. Greenall on the field-day held in April; lecture by Mr. A. Grant, Department of Agriculture, Timaru, on "Sugar-beet."

Central Otago.

Upper Clutha.—Meeting held at Mr. J. Rowley's residence. Each member was given a bulletin at the previous meeting and had to give a short talk on the particular subject of his bulletin. A short talk was given by Mr. Barret on his trip from New Zealand to England.

Upper Manuherikia.—A successful ball was held on 20th May in the Lauder Hall. Songs by B. Kane and I. Hamilton were greatly appreciated by the audience. The "lucky spot" waltz was won by Miss P. Pitches and Mr. J. Moran. The club chairman, Mr. J. C. Wilson, welcomed the guests on behalf of the club, and gave an interesting outline of the club's work. He expressed pleasure at the presence of Mr. G. G. Calder, the District Secretary, who gave a *résumé* of the aims and objects of the organization. At the monthly meeting keen interest was shown in the impromptu speeches, covering a wide range of farming topics.

Dunedin.

Palmerston South.—Lecture by Mr. S. R. Craig, Inspector of Stock, on "Two of the Common Ailments met with on Farms—namely, Abortion and Mammitis." Mr. Craig explained the symptoms, causes, &c., and suggested cures, also giving precautions to be taken against the diseases.

West Taieri.—The members joined the Women's Division and the Farmers' Union to bid *bon voyage* to Mr. and Mrs. A. Trent on the eve of their trip to Great Britain.

North Otago.

Five Forks.—Lecture on "Trees and Tree-planting" by Mr. Kibblewhite. At the previous meeting a lecture was given by Mr. Simpson, Oamaru, on "The Export of Frozen Meat."

Hampden.—Lecture by Mr. T. A. Sellwood, Department of Agriculture, on "The Growing of Mangels." At the previous meeting Mr. Congalton gave an interesting address on his experiences in fat-lamb raising.

Upper Waitaki.—Arrangements were completed for a club dance. An address was given by Mr. J. McKenzie on his trip abroad, dealing particularly with farming conditions in England.

Tokarahi.—A series of short, impromptu debates were held, the subjects being as follows: The best kinds to grow of (1) wheat, (2) oats; the best kinds to breed of (1) cattle, (2) sheep; (3) the best method of wintering hoggets. Two members each took a subject, and some very interesting points were brought out, the evening proving very profitable.

Waitaki-Hilderthorpe.—Lecture by Mr. R. B. Paton on "Wheat-growing."

South Canterbury.

Arno.—Two very interesting debates took place at a meeting on 1st June. The subject, "That Road Transport is more Beneficial to the Farming Community than Rail Transport," was debated by the junior members—N. Nelmes, D. McDonald, and H. Olerenshaw (affirmative), G. McKenzie, L. McLachlan, and T. Dyer (negative). The latter were adjudged the winners. The senior members debated the subject "That Guaranteed Prices are better than Open Markets." I. Ross, G. Thomas, and H. McKenzie (affirmative) were adjudged the winners, and the negative side was taken by C. Verity, Arch. Falloon, and C. Olerenshaw. The debates were capably judged by Mr. H. H. Meredith. At a later meeting talking-picture films on matters of farming interest were exhibited.

Fairlie.—Club debate on the subject "That Horses are more Economical than Tractors." The following members took part: Affirmative, B. O'Neill, A. Whatman, and B. Ellis; negative, C. Goulter, H. Munro, and A. C. Gallagher.

Geraldine.—Lantern lecture by Mr. C. C. Leitch, Department of Agriculture, on "The Diseases of Potatoes."

Hunter.—It was decided to hold fortnightly meetings, lectures to be arranged for every second meeting, and the alternate evenings to be used for debates, impromptu speeches, &c. An address on "Seeds" was given by Mr. Marshall, of Timaru. At the second meeting the chairman extended a welcome to Mr. J. T. Anstey, and congratulated him on his successes at Lincoln College. Mr. Anstey is a Y.F.C. Scholarship holder at Lincoln College. Mr. Anstey gave his fellow club members an interesting and detailed account of life at Lincoln College, and answered questions asked by the various members. Mr. Anstey was accorded a hearty vote of thanks.

Maungati.—Debate on the subject "Is Agricultural Farming more Profitable than Pastoral Farming." Three members were in each team. The team favouring pastoral farming won the decision by 99 points to 93.

Pleasant Point.—Lecture on "Wool" by Mr. Collins, of Messrs. Dalgety and Co. The desirable types of wool were described, and advice given in connection with shearing, shirting, rolling, classing, pressing, and other work in preparation for marketing the clip. The interest taken in the lecture was shown by the number of questions asked at the conclusion.

Southburn - Lyalldale. — A sound-film dealing with matters of farming interest was screened.

Waihaorunga.—A lecture was given by Mr. A. B. Struthers on "Farm Law and the Necessity for Insurance." At a previous meeting an address was given by Mr. A. M. Paterson, Timaru, on "Interesting Topics in relation to Agriculture, Past and Present." A field-day was held on the 28th May on Holme Station, Pareora. Visiting members from other clubs totalled about 50, while the farmers and general public in attendance brought the grand total up to approximately 400. Mr. A. S. Elworthy made the opening speech, and demonstrations included the following: Southdowns (Mr. Alan Grant, Waimate); Romneys (Mr. Hannah, Lincoln College); English Leicesters (Mr. Sidey, Lincoln College).

Mid-Canterbury.

Mayfield.—Arrangements were made for a dance; address by Mr. Barker, Farmers' Union Organizer.

Methven.—Lecture by Mr. Haydon on "The Argentine, and the Sheep of that Country."

Christchurch.

Ellesmere. — Address by Mr. J. W. Calder, Lincoln College, on "Changes in Farming." It was decided to accept the challenge from the Darfield Club to a debate in the near future.

Ladbrooks.—Appointment of speakers to represent club in debate against Springston Club; address on "Farm Accountancy" by Dr. Weston, of Lincoln College. Members of Springston Club attended this meeting.

Springston.—Debate with Ladbrooks Club on the subject "That Baled Hay is Superior to Stacked Hay." The speakers were as follows: (Ladbrooks) D. Partridge, W. Wood, M. Meyer; (Springston) R. Harris, C. Tyson, K. Moore. The judge, Professor Hudson, of Lincoln College, adjudged the Springston team the winners.

North Canterbury.

Amberley.—Lecture on "Diseases of Stock" by Mr. E. L. Siddall, Government Veterinarian.

Cust.—Address by Mr. A. M. Carpenter entitled "Travels Abroad"; combined meeting with W.D.F.U. and Farmers' Union.

Oxford.—Final arrangements were made for the annual ball. A discussion took place on programme of lectures, &c.

Nelson.

Dovedale.—The Farmers' Union (Dovedale Branch) accepted the club's challenge to debate the subject "That Modern Science is a Menace to Humanity," the debate to be aranged at an early date. An interesting lecture was given by Mr. D. Merry, Department of Agriculture, on "Modern Fertilizers: Their Manufacture and Application."

Motueka.—Lecture by Mr. D. Merry, Department of Agriculture, on "The Importance of Strain in Grasses and Clovers."

Motupiko.—Field-day on the property of Mr. F. R. Berryman, Motupiko. Mr. G. Blair, Inspector of Stock, Nelson, detailed common ailments and diseases of farm animals, together with the necessary treatments. This was followed by a post-mortem examination of a hogget, showing internal parasites, the methods of control being dealt with. Mr. D. Merry, Instructor in Agriculture, described the effectiveness of borax in the control of the physiological disease of turnips and swedes, known as "brown heart" or "mottled heart." Samples of affected roots were exhibited. Attention was also drawn to a field dominant in subterranean clover, and the value of this clover as a pasture plant was stressed. Following a number of questions on the various topics under demonstration, Mr. G. Grant, the club chairman, conveyed the thanks of the club to all who had contributed to the undoubted success of the club's first field-day.

Moutere. — Discussion regarding the forthcoming educational work in Wellington (commencing 27th June); six members signified their intention of attending. A demonstration of soldering was arranged for the next meeting of the club. A field-day was held on 23rd June, over 40 members and farmer friends visiting the property of Mr. C. A. Newport, Braeburn, for the purpose of inspecting the grass and clover plot trials laid down as a demonstration area by the Department of Agriculture. Mr. P. T. Driver, President, Moutere Farmers' Union, introduced Mr. D. Merry, Instructor in Agriculture, Nelson, who conducted the party over the area and described the sowings on the respective plots. The superiority of certified lines of grasses and clovers over ordinary uncertified commercial lines was demonstrated. The success of Montgomeryshire red clover was also apparent. The visitors were shown an adjacent block devoted to a fertilizer trial, after which Mr. Newport conducted the party over portions of his farm, detailing the results following liming and top-dressing and the successful establishment of subterranean clover. An area planted in pampas-grass also attracted interest. Mr. Driver, on behalf of those present, thanked Messrs. Newport and Merry for the instructive afternoon, and stressed the value of such practical demonstrations to the farming community. The day was brought to a pleasant conclusion by the hospitality of Mrs. Newport, assisted by members of the Women's Division, in providing afternoon tea.

Manawatu.

Apiti.—Talks by Mr. J. Pentney and F. Viles on their impressions of the Manawatu Club's camping tour; two-minute talks by members on "The Amenities of Town Life *v.* Country" for the purpose of choosing suitable members for the forthcoming debating competition.

Kairanga.—Lecture by Mr. E. P. Neilsen on "Pig-recording Clubs." It was considered that a pig club could be formed in the district in the near future. At the previous meeting a lecture was given by Mr. H. A. Seifert on "The Grazing of Sheep on Dairy-farms."

Kimbolton.—Talks by Messrs. A. Cowan and A. Viles, of Apiti Club (both members of the New Zealand touring team), on their Australian tour.

Otaki – Te Horo.—Talk by Mr. C. C. Holmes on "Debates, and How They should be Conducted." This was followed by a debate, "Tractor *v.* Horses," those favouring the horses being the winners.

Pohangina Valley.—A debate on the subject "That a Combination of Cropping and Pasture is more Profitable than All-pasture Farming" was won by the affirmative. A lecture was given by Mr. J. F. Kilgour, of Apiti, on "Practical Forestry."

Rangiotu.—Lecture by Mr. G. S. Robinson, Department of Agriculture, on "Lucerne-growing on Heavy Soils and on Sandy Country."

Rangiwahia.—Brief outlines of the Manawatu educational tour, by D. Hight and R. Hancock.

Woodville.—Arrangements for dance; brief talks on the educational tour by members who took part.

Wairarapa.

Ballance. — Discussion regarding recreational and social activities; talks by three members on their experiences while on tour of the North Island with the Wairarapa Club's touring party.

Carterton.—It was decided to send a bus-load of members through to Palmerston North to support the Manawatu Club in their Winter Show activity. A lecture was given by Mr. M. Davey on "The Establishment and Maintenance of a Homestead Orchard."

Eketahuna.—It was decided to send a football team to Palmerston North to take part in the Y.F.C. seven-a-side contests; lecture on milk by Mr. J. C. Barnes.

Featherston.—Interesting and instructive lecture by Dr. G. S. Sharp, on "First Aid on the Farm," including the treatment of burns and resuscitation after drowning.

Martinborough.—Discussion on proposed dance; talks by Messrs. H. McKenzie and A. Fisher, of Carterton Club, on the highlights of their Australian trip as members of the New Zealand touring team.

Pongaroa.—Talk by T. Hall, a club member, on "The Grass Grub."

Tinui.—Interesting talk by Rev. Mr. Dobb, on "Surveying." A field-day was held on Mr. Hugh Morrison's property, "Awatoitoi," on 10th June. Mr. Morrison demonstrated on "Draining," and "The Development of Second-class Land by Subdivision and Rotational Grazing," and also delivered an address on "The Future of the Young Farmer." Mr. Mulvaney gave talks and demonstrations on "Chilled Beef," and "The Utility Ewe." There was a total attendance of 34.

Wanganui.

Bulls.—Lecture by Mr. Hill Motion on "Sheep Diseases and Facial Eczema." At the previous meeting Mr. F. C. Jurgens gave an address on "Pasture Management." A successful field-day was held at Ngaio Station, where Mr. J. G. Wison gave an address. Mr. McLeod gave an address on "Chilled Beef," and demonstrated on some Black Polled Angus heifers. He also gave a demonstration on a dressed carcass. During the day a sawing contest was held among club members, C. Anderson and E. Carter being the winners. Mr. Wilson presented them both with a sheath-knife. There were 21 present.

Hunterville.—Address by Mr. R. M. S. Jones on "Public Speaking and Debating." At a previous meeting a lecture by Mr. A. R. Dingwall, Department of Agriculture, on "Rye-grass" created great interest, the matter of palatability evoking considerable discussion.

Marton.—General discussion regarding educational week, &c.; it was decided to give whole-hearted support to Manawatu activities at the Palmerston North Winter Show; lecture by Mr. Hill Motion on "Lambing and Calving Troubles."

Westmere.—Lecture by Mr. A. J. Burtt on "Pasture Establishment." At the previous meeting lectures were given by Mr. A. R. Dingwall, Department of Agriculture, on "Pasture Management," and Mr. W. S. Emmett, on "Internal Parasites of Sheep," and "The Prevention and Control of Hydatids in Sheep and Dogs." A number of club members, together with a party of Technical School boys, paid a visit to the New Zealand championship sheep dog trials at Paparangi, where they were addressed by Mr. R. J. McDonald on "The Training and Working of Sheep Dogs."

South Taranaki.

Alton.—Arrangements regarding a visit to the Renco Laboratory at Eltham; talks by members who had undertaken the Y.F.C. South Island tour.

Hawera.—Talk by Mr. H. G. Whitehead on "The Work of Bacteria in the Soil." At the previous meeting a talk was given by Mr. P. O. Veale on "The Uses of Cobalt."

Kaponga.—Address by Mr. Crawford on "The Importance of Dairy Hygiene." At a previous meeting J. Brassell, a club member, gave a talk on a field-day spent with the visiting United Kingdom young farmers.

Pukengahu.—Talks by Mr. T. T. Murray on "Land Valuing," and "Cultivation on Farms."

North Taranaki.

Cardiff.—Field-day at Messrs. Duncan and Davies' Nursery, New Plymouth. There was an attendance of 24, and the programme included an instructive demonstration on horticulture by Mr. Davies.

Toko.—Field-day in Lepperton district, with members of Pukengahu Club, South Taranaki. Messrs. J. E. Davies (Hawera) and A. G. Elliott (New Plymouth), both of the Department of Agriculture, were present, and gave demonstrations and talks on the various farms visited. Members of the Farmers' Union were also present.

Southern Hawke's Bay.

Norsewood.—Debate on "Tractor *v.* Horses." M. Olsen and B. Anderson took the side of the horses, and J. C. Kilgour and D. Hartnett spoke for the tractor.

Poverty Bay.

Nuhaka.—Arrangements made for dance. J. G. McTyre read a paper on "The Skinning of a Beast and the Preparation of the Hide for Tanning." A copy of a lecture delivered at Massey College by Mr. Grimmett on "Licks and Their Uses" was read and discussed by club members.

Tolaga Bay.—Talks by club members as follows: "Preparing Wool for Sale in Stores" (H. Irving); "Rearing of Pigs" (N. Sadler); "Trip Organized by South Taranaki Clubs to the South Island" (H. Ancell); "The Sewing of Leather" (C. O'Connell).

Waiapu.—Arrangements regarding social; lecture by Mr. A. V. Singe on "The Care of Hides and Skins."

Te Kuiti.

Aria.—Accounts received in connection with dance, which was very successful; discussion regarding the programme for current year.

Te Anga Central.—Field-day on the property of Mr. E. Phillips, Marakopo. Mr. W. G. Bonner, Inspector of Stock, gave a post-mortem examination of a cow. Twelve club members attended.

Bay of Plenty.

Edgecumbe.—Lecture by Mr. Pain, Awaheri, on "First Aid on the Farm."

Katikati.—Talks by members as follows: "The Recent South Island Tour" (H. Capamagain); "A Trip Round the North Island" (D. Thomas); "5th Mounted Rifles Annual Camp" (G. T. Walford); "The Spiral" (J. N. Hooker).

Tauranga.—Talk on "Debating" by Mr. Angus, followed by a practice debate in readiness for a debate in a fortnight's time, the subject to be "That Sheep-farming is a more Pleasant Occupation than Dairy-farming."

Waihi.—Arrangements for debate with Katikati Club. A club debate was held, the subject being "That Tours to other Districts are of more Value than Farm Schools." The speakers were B. Thornton, K. Sutton, M. Wheatley, F. Pocock, W. Martin, D. Martin, A. Martin, T. F. Sutton, F. Sutton, and A. Sutton.

Rotorua.

Ngakuru.—Account received of the dance, which proved to be one of the most successful yet held in the district, both from a social and a financial viewpoint. The club is to be congratulated on its efforts, which were well rewarded.

Putaruru.—Arrangements for field-day; general business; election of delegates to the District Committee, &c.

Waikato.

Te Aroha.—Lantern lecture on "Modern Pig-keeping" by H. M. Piersen, Department of Agriculture.

Te Kowhai.—A paper on "The Jersey" read by I. A. Porter, a club member, which was freely discussed by those present.

North Auckland.

Arapohue.—Lantern lecture by Mr. E. H. Arnold, Department of Agriculture, on "Cultivation." At the following meeting Mr. J. C. Ambury gave an address on "Sheep Management during the Winter Months."

Marohemo.—Field-day on property of Messrs. Snelling Bros., Maungaturoto. Mr. T. H. Hankin, Government Veterinarian, gave an interesting talk on "Facial Eczema." An affected sheep was killed and examined.

Matarau.—An impromptu debate on the subject of "Horse *v.* Tractor" was staged, and proved of great interest, the members regarding it as excellent practice for future set debates.

Oruru.—An interesting and instructive talk on "Farm Book-keeping" was given by Mr. C. S. Puckey.

Health Notes for the Farm.

Contributed by the Department of Health.

Pure Water for Every-day Use.

Traverse the desert, and then ye can tell
What treasures exist with the cold deep well,
Sink in despair on the red parched earth
And then ye may reckon what water is worth.

THERE is an old saying, "You never miss the water until the well goes dry," which, like many others of its kind, contains a wealth of sound philosophy. In favoured places where a copious supply of pure, wholesome water can be obtained at any time merely by turning a tap little thought is given to the intricate organization necessary to bring the water indoors and to preserve the purity and constancy of the supply. In the country, where some personal effort is required to work a pump or dip the water out of a well, rather more thought is given to the matter, while a prolonged period of drought serves to emphasize the lesson inculcated in the saying quoted.

In the arid regions of the world, parts of Australia for example, a drought means death to thousands of animals and occasionally to human beings as well. It is not necessary, however, in order to appreciate the value of a plentiful water-supply, to experience such extreme hardship as described by George McIver in the following extract from his book, "A Drover's Odyssey":—

Thirst in the Desert.

"Most of those who died from thirst in the interior—and the number is greater than usually surmised—lost their lives through leaving the track to look for water. . . . The water we had left that morning was fifteen miles distant and the nearest seventeen miles away. Unwisely, we decided on the former."

The author goes on to say: "My load was getting heavier and I was growing weaker, my tongue was swollen and seemed much too large for my mouth; more distressing, my mouth felt as if it were filled with salt. I began to wonder how long it would be before my mind began to wander. We spoke little. Indeed, I could only speak with difficulty.

"Scanning the horizon, we noticed a bank higher than any we had yet seen about half a mile distant, and although getting still farther away from the trail we made towards it.

"On reaching it we suddenly stood still for the moment: I considered if it were one of those visions sometimes seen by those about to lose their lives from thirst. There before us was a pool of clear water from twelve to eighteen inches deep and grass growing in the bottom.

"Knowing the danger of drinking deeply, each filled his pannikin and stretched himself along the ground to sip it slowly, and each kept warning the others when a too prolonged sip was noticed. Beyond this, none of us spoke. We emptied many pannikins of water before we thought of making tea. Our hearts were full."

Prime Necessity of Life.

From such a vivid account we are impressed that water is a prime necessity of life. Not only is it so as an article of diet, but also for the proper cleanliness of persons, clothing, and things. A serious shortage of water in a large city for a lengthy period is an economic disaster as well as a serious menace to public health. The same applies to country districts. In times of drought, animal and human life is imperilled.

Water is a fundamental requirement. It enters into the chemical composition of the tissues; it forms the chief ingredient of all the fluids of the body and maintains their proper degree of dilution, and this favours the general body functions it furnishes in the blood and lymph a fluid medium by which food may be taken to remote parts of the body and the waste material removed; it serves as a distributor of body heat and also regulates the body temperature by process of absorption and evaporation.

The chief organs of elimination are the kidneys, and water is the chief agent of elimination. People who habitually drink too little water while otherwise living under hygienic conditions may experience an increase of health and energy by attending systematically to this simple and important need. A good rule is to drink six glasses of water daily—one on arising, one in the forenoon, one in the afternoon, and one at each meal.

Effect on Digestion.

It is sometimes stated that the drinking of water at meals is apt to delay digestion. Water may actually hasten the digestion of some foods by softening them and favouring their reduction to a state of pulp, while hot water is a powerful stimulant of the stomach movements. There is much to be said for the practice of drinking at least one glass of water at meals, except in the case of certain diseases, when it may not be advised by the physician. On the other hand, there is no particular advantages from very free water-drinking as some practice it—for example, ten to sixteen glasses daily.

Then, again, it should be borne in mind that the drinking of water is not advisable for farmers while perspiring freely when engaged in work such as shearing, hay-making, &c.; oatmeal water should be used in such circumstances to quench the thirst. When loss by sweating is great the drinking of much pure water impoverishes the body of certain salts and is liable to produce cramps. This may be obviated by the addition of a little salt to the water. This also applies to animals. In England before the advent of the automobile the ostler of the inn used to bring out a bucket of chilled oatmeal water for the hard-driven, sweating horses.

In the interests of personal hygiene a plentiful supply of water is essential. Cold baths are less cleansing than hot, but are more stimulating. Persons in

whom a feeling of warmth does not immediately follow a cold bath should not use them. The temperature of the water should be regulated to the age and strength of the bather. To remain in the water until a sensation of cold is experienced is detrimental to health.

Types of Water.

Water originates from rain or snow. When it falls upon the surface of the earth it results in three kinds of waters. The water which flows on the surface of the ground and forms what is known as mountain brooks, streams, rivers, ponds, and lakes is called surface water. Another portion soaks into the ground and disappears from sight. This flows along a hidden course between the particles of the soil and rock and other hollow spaces, and sometimes appears on the surface of the earth in the form of springs. Sometimes the water is brought to the surface by means of wells dug by man. This kind of water is known as ground water. Another kind is water vapour which returns to the atmosphere and will later fall again in the form of rain. This is the continuous natural cycle of all water found on the earth.

Rain-water collected from roofs, particularly in rural areas, where it is free from smoke and soot and from the dust of industries, provides with proper storage a pure and wholesome water for domestic use. A small house with a roof area of 500 square feet will collect 7,800 gallons of water in a year with a rainfall of 30 in. This will provide more than 20 gallons a day for the house. A useful rule for ascertaining quickly how much water can be collected from a roof when the average rainfall is known is to multiply the area of the roof in square feet by half the average rainfall in inches. Thus, in the case of the house referred to, 500 multiplied by 30 and divided by 2 equals 7,500 gallons, which is not very far from the actual figure of 7,800 gallons, and allows something for losses which occur by splashing, evaporation, and absorption by the tiles or slates.

Methods of Storage.

In country places it is found that 5 gallons a day for each person can be made to suffice for household needs. A storage-capacity of 1,000 gallons would therefore afford a supply for fifty days to a house inhabited by four persons, and this storage-capacity should be regarded as the minimum for each house if rain-water is to be the principal source of supply.

If rain-water is required as an auxiliary supply to wells or other sources, tanks and water butts above the ground to collect the water from the roof as it falls down the pipes from the gutters are the most convenient receptacles. The circular type of galvanized tank made up of corrugated sheets serves the purpose well. A circular galvanized-iron tank 3 ft. in diameter and 4 ft. high holds about 170 gallons.

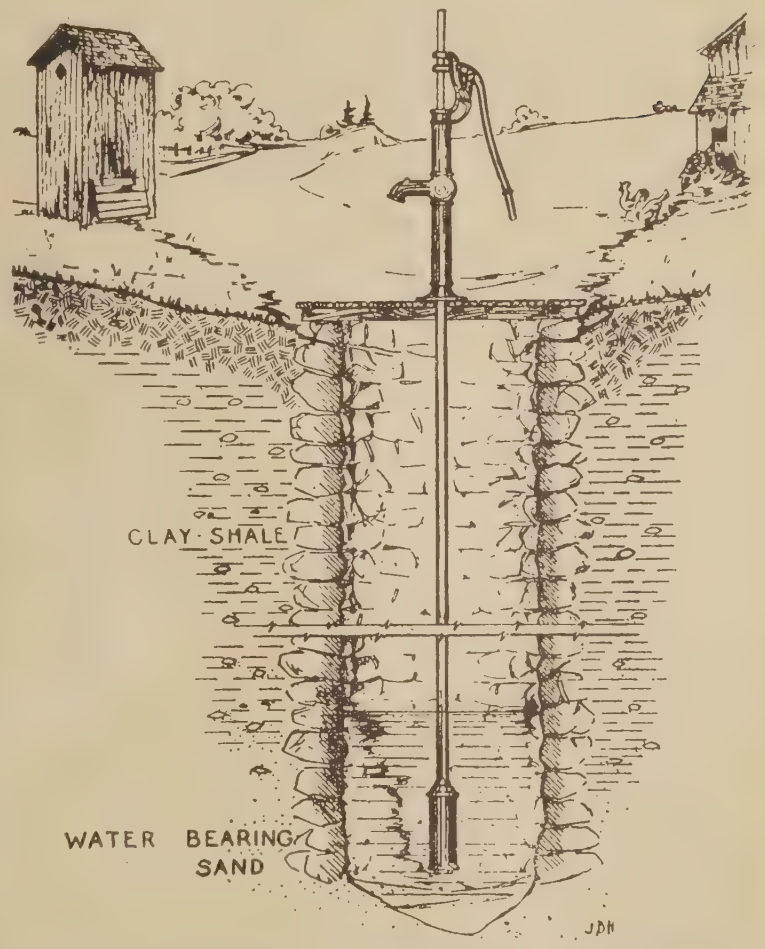

Fig. 1.—A badly situated and constructed well. Water from such a source is liable to pollution, and is therefore unsafe for drinking purposes.

Where rain-water is to be the principal source of supply, underground storage tanks are generally used, and are to be recommended. A circular tank 6 ft. in diameter and 6 ft. deep has a capacity of just over 1,000 gallons. The site should be carefully selected, and its construction made up of good concrete at least 8 in. thick, plastered internally with a rendering 1 in. thick of one part of cement to two parts of clean sand. Brickwork at least 9 in. thick laid in cement mortar with a cement concrete bottom is satisfactory.

Cement rendering throughout the inside is required, and if the ground is manured in any way it is best to place puddle clay around the outside of the brickwork, because bricks soak up drainage-water from the soil. A watertight tank cannot be made without good materials and plenty of cement. Where rain-water storage is contemplated, a large amount of lead on the roof should be avoided; otherwise there is a possibility of lead appearing in the water.

The installation of hydraulic rams is advocated in places where there are swift-running streams of potable water. These tend to ensure a continuous supply of water without manual exertion, and are an hygienic substitute for roof catchment areas. Windmills for underground tanks and subterranean supplies are valuable.

Risk of Contamination.

In Nature, water comes in contact with many surfaces and substances, and therefore is particularly liable to become contaminated. Great care should therefore be taken to prevent water that is to be used by human beings from being contaminated with the germs of disease, such as typhoid. Germs and parasites get into water through the discharges of infected human beings or animals, and in order to prevent healthy persons from becoming ill it is necessary that water should be kept free from human and animal filth.

Appeal to Maoris.

To the Maori readers of this *Journal* an appeal is made to see that their water-supply is pure. One of the Department's medical officers reports in this connection: "Another series of cases of typhoid in Maoris was almost certainly due to defective sanitation. A group of communal Maoris with no privies at all and shallow waterholes that readily received the seepage from the huts on the higher level have typhoid cases in each house of the group. All contacts were inoculated, tube privies built, and the water condemned unless boiled. The typhoid cases ceased, and this little community are now installing tanks, having become a little more sanitary conscious than formerly."

Every precaution should be taken by rural dwellers in using water from shallow wells. If the water is procured from the subsoil the well should be sunk in such a position and be so constructed and furnished on top that there is no danger of contamination. The illustration of a badly situated and constructed well, and that of a better type of well affording protection from pollution, convey their lesson.

The streams, rivers, and lakes in this country constitute resources of inestimable value. A great effort for the preservation of purity of these waters is fully justified and is especially important because of the insidious way that small pollutions grow into great ones and streams become badly polluted before it is realized, demanding remedial measures which are expensive and difficult to apply.

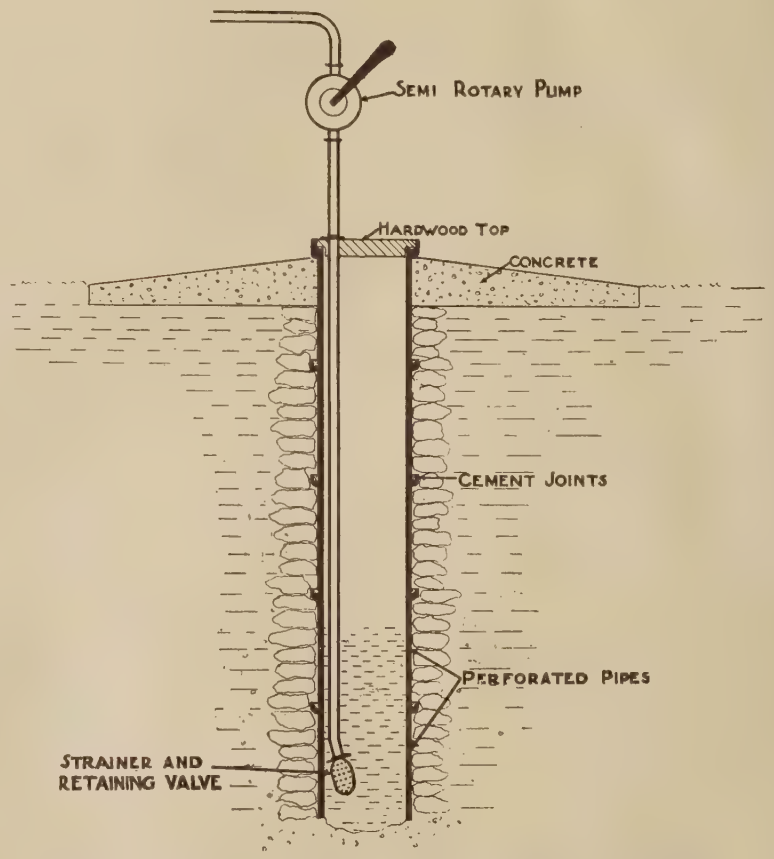

Fig. 2.—A better type of well, affording protection from pollution.

Advice from Experts.

Our Medical Officers of Health and Inspectors of Health are ever ready to give advice to any one as to the safety of a supply. As a general rule, the different supplies of water are carefully selected and supervised to ensure safe water. However, it is a good rule never to drink water from lakes or rivers, creeks, &c., without boiling it, unless the source of supply has been approved. Water for human consumption should be above suspicion. From a sanitary standpoint, the aim should be to encourage a generous use of water, but to discourage waste.

To recapitulate, much value should be placed on water, as it is a prime necessity of life. Great credit is due to sanitarians, engineers, and local authorities who design an adequate and safe supply of this precious element. Great credit is also due to the housewife who uses it wisely and carefully without avoidable waste, and the farmer who ensures that he has a plentiful and pure supply for domestic and farm needs. Fortunately, in New Zealand the public water-supplies are usually so good that most of us can safely follow the advice to drink ample water.*

More than two thousand years ago Aristotle, the Greek philosopher, expressed a great truth when he wrote: "The greatest influence on health is exerted by those things which are used freely and are frequently required for our existence, and this is especially true of water and air."

* Valuable information on water-supplies is contained in the Department of Scientific and Industrial Research Bulletin No. 48, "Water-supplies of Farms and Dairy Factories in Hamilton Basin and Hauraki Lowland,"—N. H. Taylor. Price, 1s. 6d., Government Printer, Wellington.

The Farm Home and Kitchen.

Contributed by Department of Home Science, University of Otago.

A Menu for Midwinter.

IN planning meals at any time there are three things to consider—first, the food materials available; secondly, the food needs of those for whom the meals are planned; and, thirdly, the peculiarities of the climate or season that make special type of diets desirable.

Now that winter is here, the foods available for the use of even those who do not have to consider economy to any great extent and have the benefit of well-equipped shops are not as many as at most times of the year. While mutton and stores in the form of cereals and other groceries are still available in the country, the supply of vegetables begins to be a problem, particularly in the colder districts, and the milk-supply may be very poor. In homes where economy is an important consideration fruit and vegetables and eggs and milk are all becoming decidedly costly. All the usual meat is for sale in the cities. Hearts, livers, sheep's heads, neck ends of shoulders and the cheaper cuts of beef are all available for those economizing. Veal is excellent at present, and so are rabbits.

In the greengrocers one finds celery, brussels sprouts, spinach, beets, kumeras, cauliflowers, pumpkins, cabbage, silver-beet, swedes, onions, and the ubiquitous potato. Although some of the earlier ones in the list may be too expensive for some purses, there is good value to be had by buying the more everyday ones, provided one knows of a variety of interesting ways of serving them. Surely cabbage need not be regarded as our national vegetable.

Fruit and Dried Fruit.

Fruits are beginning to become rather high in price for some purses, so while I would recommend the purchase of as much fruit as you can possibly afford it is time now to start ekeing it out with dried fruits. Dried apples, peaches, apricots, and prunes are, if well soaked and cooked, the next best thing to the fresh article.

In the storeroom the cereals (sago, rice, and tapioca) and the legumes (lentils, split peas, and dried beans) will be very useful as the basis for high calorie dishes at low cost. As milk in some places will be a problem, let me urge the use of dried milk as a cheap and reliable substitute for fresh milk for all cooking purposes. It is easily procurable at all times of the year.

Before planning the use of these foods it is necessary to remember the food needs of the family and the special bearing the winter season has on modifying our normal requirement. As we wish to keep well during the winter it is necessary for us to maintain our supply of health-protecting foods—milk, vegetables, and fruits in particular—and also to see that the normal supply of butter is maintained.

Vegetables Desirable.

Vegetables and fruits are particularly ueful in keeping the body healthy; the vitamins in them and their minerals are both important. Hence, the greater the shortage of vegetables, the more care must be exercised to see that the method of cooking and serving what few there are will conserve these food elements. The use of vegetables of all kinds in soup stock is therefore most desirable, as the minerals extracted by cooking will all be found in the stock. Similarly, the saving and use of vegetable water in winter is much to be desired. As much of the virtue of a vegetable lies just under its skin, it is desirable to use methods of cooking by which the skin can be peeled off after cooking or left on and eaten, as in a baked potato.

Further, to use vegetables to the very best advantage I can recommend salads with a meal which is otherwise low in minerals and vitamins. Served with a tasty dressing, any green vegetable, such as spinach, cabbage, curly kale, &c., can be used as a salad green if shredded finely. This also applies to grated raw carrot and beetroot. Apple, celery, and nut salad, and carrot and cabbage and date salad, are popular wherever they have been introduced. The fibre of fruit and vegetables is as necessary in winter as in summer, and, in addition, a fair proportion of all the flour used should be wholewheat, to provide roughage and Vitamin B.

Heat-giving Foods.

In winter we use up more heat than in summer, so that we naturally turn to richer and more substantial foods. Breakfasts are made a little more difficult by the absence of eggs and fresh fruit, which at most times are the standby of those who like a cooked breakfast and those who like a light one. It is desirable to have a somewhat heavier breakfast in winter than in summer. This can be done by using a slightly more fatty breakfast in winter, as fat retards digestion and prolongs the satisfied after-meal feeling. Hence the popularity of bacon and other fried and fatty foods with those doing steady, manual labour, and its avoidance by those wishing to be mentally alert soon after a meal.

For winter breakfasts, however, there should be a tendency towards slightly more fatty foods than at other times. For those who have plenty to spend on food such breakfasts are no problem, as liver and bacon and other grills will satisfy the hungry. But those economizing do not need to worry if they cannot afford meat for breakfast, as it is the fat and not the meat itself that gives the food its lasting effect. Bread dipped in milk and fried is an easy and cheap

way to introduce some fat. Yorkshire bacon is another satisfactory breakfast where economy must be considered. It is made like toad-in-the-hole, using a little bacon in place of the sausage.

Dried fruits of all kinds are a welcome substitute for the unprocurable fresh fruit for a light breakfast. Stewed apricots on fried bread is very satisfying, and there are few things nicer for breakfast than a baked apple, cored and stuffed with dates or brown sugar and cinnamon. A little bacon with stewed or fried apple is a tasty and suitable addition for winter. Apple-fritters are good, but rather too fussy, for breakfast, being more suited for a tea dish.

Hot-cakes for Breakfast.

Hot-cakes are a popular American breakfast, although there are not many New-Zealanders who serve them. They are very like large, light pikelets, the mixture containing plenty of wholemeal, shortening, and baking-powder. They are eaten in piles, hot and buttered and smothered in syrup. Indigestible though they may sound, they make a good breakfast on a cold day. Potato-cakes, too, are suitable.

These fatty breakfasts do not apply to those who are going to spend the best part of their days indoors without taking any brisk exercise, because although winter is here they do not need to alter their diets to any great extent. Modifications to make diets more substantial in winter are for those who will be exposed to the cold and who will use up a large number of calories in keeping warm and working hard. It is true that one may be more hungry in the winter, but one should resist the temptation to eat rich foods and large quantities of cake, bread and butter, and chocolate without taking exercise. The penalties will be increased weight and probably digestive upsets, such as liverish turns.

Some people have midday dinners, with a hot tea at night, and others hot lunches and an evening dinner. Hot-tea dishes would be just as suitable if served as hot-luncheon dishes. Dinners in winter, more than at any other time, should begin with soup, although if this meal is otherwise substantial the soup may be served for the evening meal or for lunch.

Varieties of Soups.

Scotch broth, lentil or pea soup, and all the creamy soups made of a variety of sieved, cooked vegetables and the water in which they are cooked and some white sauce are the best for winter. A large bowl of any of these with some crisp croutons of toast is almost a meal in itself. The customary meat fare may be varied by the use of such dishes as dumplings with the stew, steamed steak-and-kidney puddings, veal and ham pie, or rabbit pie. Mutton or liver casserole, with plenty of vegetables, such as onions and carrots, or the shank end of a ham (after a good soaking to remove excess salt) casseroled with kumeras and onions, will make a little meat go a long way. Stuffings are also useful in increasing the fuel content of meat. Stuffed veal, stuffed shoulder, and stuffed heart are all suitable for winter.

Vegetables can be used not only in casseroles or as a salad, as already described, but also by being served with sauces. Stuffed cabbage cooked with a little bacon, hot diced beetroot served with a tart sauce, and escalloped potatoes are other possibilities.

There is an indefinite variety of puddings for selection; to begin with, there is the whole pie family. As a change from the ever-popular apple-pie we can make all kinds of open pies, such as pumpkin-pie and the meringue-pies, with their fillings of butterscotch, lemon, chocolate, cream, banana, or cocoanut custard.

Apple Dishes.

While the apples last there are apple-dumplings and apple-slump. Apple-slump is merely spicy dumplings made of scone dough dropped into boiling stewed apples and cooked for ten to fifteen minutes. Steamed puddings come into favour at this time. Every one has the recipe for the "delicate" steamed pudding, which can be modified to form a "black cap" pudding by putting some raisins or jam in the bottom of the basin, or can have a tart jam or marmalade stirred through it to give flavour. Baked puddings, such as gingerbread, are also good.

Regarding tea dishes, Cornish pasties, rissoles, &c., are suitable for using up "left-overs," but care must be taken to ensure that a good coating of pastry or potato or breadcrumbs is on the outside to prevent the inner core of meat from being twice-cooked and so rendered less digestible. There are various good made-up dishes, such as fish-pie, using smoked fish cooked and shredded in a foundation

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of white sauce, and combinations of such cereals as rice, tapioca, and spaghetti, with vegetables, minced meat, or cheese. This gives us Spanish hash of rice, onions and minced meat, Turkish pilaf of rice, tomatoes, minced meat, spaghetti and tomato, macaroni cheese, rice and cheese croquettes, marrow stuffed with bread-crumbs and minced meat, and many other tasty and economical dishes.

In addition there are the cheese-sauce dishes, such as brussels sprouts, cauli-flower-celery au gratin, and "red bunny and cole slaw," which is welsh rabbit made with tomato puree ("red bunny") and cabbage salad or cole slaw. The legumes, too, make good and substantial dishes. There are lentil loaf and bean loaf, and, of course, baked beans and bacon and bean and nut chowder, all of which are appetising.

Marmalades in Variety.

MOST housewives realize that the mar-malade-making season has arrived, because marmalade oranges have just reached the semi-ripe semi-green stage, when the pulp is still thick and tender and the juice still tart, although fully flavoured. This is the ideal state of the fruit for marmalade-making.

When making marmalade the first step after weighing the fruit or counting it is to slice or mince it finely. If you do not care for bitter marmalade or wish to have a very clear marmalade with only a few golden shreds, peel your oranges and lemons as thinly as possible before slicing them. Save this thin peel and boil it, changing the water several times if you wish to remove the bitter flavour, until it is quite tender. When cool, cut it into long, thin shreds and add them to the rest of the marmalade when adding the sugar.

However, most prefer the natural and rather bitter marmalade flavour, in which case the rind is left on and sliced or minced with the rest of the fruit. Many do not seem to realize that where much marmalade has to be made mincing is an excellent substitute for slicing. The method often followed is to cut the fruit in half and squeeze it on a lemon-squeezer, removing the pips and putting the juice into the preserving pan. The stringy pith is then removed and, using the medium mincer, the skins minced. The pips are tied up in a piece of muslin and put in with the rest.

Purposes of Boiling.

It requires only about fifteen minutes to prepare a whole boiling of marmalade in this way. The next thing is to add water and start boiling. The purposes of this boiling are threefold—(1) To soften and break down the white part of the skin; (2) to extract the pectin, or jellying substance, from it; and (3) to evaporate the water and concentrate the pectin until it is just the right concentration for jellying once the sugar has been added.

The skins take quite a long time to soften, which explains the need for fairly slow boiling at this stage of the mar-malade-making. The extracting of pectin is also rather slow, and although this rate depends largely on the rate at which the skins are softening it also depends on the degree of acidity of the fruit. Suitable quantities of pectin are extracted only when cooked in the presence of acid. This is why sour fruit forms jelly better than sweet or over-ripe fruit, and why we use under-ripe oranges for preference.

If we do wish to make sweet or very ripe oranges into marmalade we must use one or two lemons in place of some of the oranges to provide the necessary acidity, or, if desired, we can use oranges only and add citric or tartaric acid. The obvious test is to taste the fruit and then to make what adjustments you think best. To add citric or tartaric acid, dissolve half to one teaspoonful in a little hot water and stir it into the pan of uncooked fruit and water. Then taste it, and if it still tastes non-acid add more.

Time of Boiling.

The mixture is then boiled steadily for one to one and a half hours. If the fruit is fresh and early seasoned and is very finely minced or sliced it will cook up in one hour, and can be boiled somewhat more rapidly than more coarsely cut and dry fruit, which will occupy up to one and a half hours of slower cooking. There is no point in letting the marmalade stand over-night once it has been boiled. The sugar can be added at once. If the marmalade has been boiled correctly the right amount of water will have been evaporated, and the marmalade will be ready to form jelly within about thirty minutes from coming to the boil after the addition of the sugar. The shorter and quicker this second boiling, the better the colour and flavour.

It is a good plan to cook a small lump of butter with the marmalade, to keep down formation of scum, but after adding the sugar, and not before, any scum is skimmed off, the bag of pips removed, the sliced, cooked shreds of peel added if necessary, and the marmalade tested for setting.

The simplest tests are to lift the wooden spoon out of the pan and, after allowing it to cool for a moment, to see if any liquid falling from it forms a sheet of a thick semi-solid skin. The other simple test, which is familiar to every one, is to put a little of the juice on a cold saucer. In a moment or two it can be tested for setting. Meanwhile, the clean jars are being warmed, paraffin wax melted or rubbers and lids boiled, so that all the ready for bottling as soon as the marmalade sets.

Proved Recipe.

The proved recipe used to convert cases of fruit into marmalade each year for the home-science hostels is eight average-sized poorman oranges and two average-sized lemons. Squeeze, mince, and boil together with 10 pints of water steadily for one hour. Then add 10 lb. of sugar, and continue the boiling for another hour or less. If convenient, mince the fruit overnight, but otherwise boil as soon as the fruit is ready and cook the whole mixture through in one process.

Another variant of this recipe for those who are not certain of what is termed an average-sized orange or lemon is as follows: 3 lb. pulp (about nine fruit), 9 pints water, 9 lb. sugar. Any fruit may be used, bearing always in mind the necessity for acid.

Another grapefruit-marmalade recipe is as follows: one grapefruit, one lemon, sugar, ten cups of water. Wash the lemon and grapefruit, cut in pieces, remove the pips, and put through a mincer. Add the water, and soak over-night. Next day boil for one hour. Measure the liquid, adding cup for cup of sugar, and boil until the mixture jellies (usually half to three-quarters hour). Pour into sterilized jars and seal.

Cream Soups.

Soups thickened with white sauce are generally known as cream soups, milk, butter, and flour being added to stock and vegetable pulp. The simple rule for making cream soups is to have as much thin white sauce as you have vegetable pulp. The vegetable may be spinach, carrot, potato, artichoke, celery, tomato, or pumpkin (to which a little onion has been added). The thin white sauce is made on the basis of 1 cup of milk (or milk and stock) to 1 level tablespoon of flour and 1 level tablespoon of butter.

Recommended Recipes.

Treasure Trove.

Chopped peanuts, ½ cup.
Hard-cooked eggs, 2.
Diced cooked potatoes, 2 cups.
Salt, 1 teaspoon.
Flour, 2 tablespoons.
Butter or other fat, 2 tablespoons.
Milk, 1½ cups.
Cayenne.

Method.—Make white sauce from flour, butter, and milk, and add diced potatoes, coarsely chopped egg, and chopped peanuts. Heat and serve immediately.

Oyster Cocktail.

Tomato juice, 1 pint.
Lemon juice, 2 tablespoons.
Worcester sauce, 1 teaspoon.
Tobasco sauce, 4 drops.
Oysters, 2 dozen.
Pepper and salt to taste.

Method.—Cut the oysters in halves and place eight pieces in each cocktail glass. Cover with the above mixture and serve garnished with parsley and lemon slice.

Fish Souffle.

Butter, 3 tablespoons.
Flour, 3 tablespoons.
Milk, 3 cups.
Fish (shredded and cooked), 1½ to 2 cups.
Eggs, 3.
Lemon juice, 2 teaspoons.
Parsley, 1 teaspoon.
Salt and pepper.

Method.—Make a white sauce of the milk, flour, and butter. Add the seasonings, yolks of eggs beaten till stiff, and shredded fish. Fold in the stiffly beaten whites. Bake in an oven 275° F. to 300° F., having the dish standing in water for thirty minutes. Serve immediately.

Kidney Rolls.

Breadcrumbs, ½ cup.
Onion, 1 small.
Parsley, chopped, 1 teaspoon.
Egg, 1.
Slices of bacon, 8.
Lamb's kidneys, 2.
Salt.
Pepper.

Method.—Mix breadcrumbs, chopped onion, parsley, and seasonings in bowl and moisten with egg. Spread mixture on thin slices of bacon, fasten around pieces of lamb's kidneys, using skewers. Bake in oven of 375° F. for twenty minutes.

Onion Soup.

Medium-sized onions, 4.
Butter or dripping, ½ cup.
Bread or toast crumbs (no crusts), 1 cup.
Milk or stock.
Salt and pepper.
Grated cheese.

Method.—Cut the onions into quarters and stew in a saucepan with a very tightly fitting lid with the butter or dripping for one hour. Add the crumbs and cover with the milk or stock. Season with salt and pepper and allow to simmer for another hour. Put all through a sieve and serve hot with grated cheese.

Little Roulades of Sole and Tomato Sauce.

Fillets of sole, 8.
Stale breadcrumbs, 1 cup.
Poultry seasoning, ½ teaspoon.
Onions (sautéd), 1 tablespoon.
Butter or oil, 1 tablespoon.
Flour, 1 tablespoon.
Tomato purée, ½ cup.
Parsley, 1 tablespoon.
Broth or stock, ½ cup.

Method.—Mix soft breadcrumbs and ½ tablespoon of sautéd, but not browned, onion, poultry seasoning, and other seasoning. Moisten with a little egg or butter, spread this forcemeat on each fillet and roll, fixing each by means of a wooden toothpick. Dip in salted milk, then in finely sifted breadcrumbs. Dot with butter, and bake in a hot oven for ten minutes or until golden-brown in colour. Simmer tomato purée and other ½ tablespoon of onion and broth. Strain and use as liquid in the preparation of sauce. Season and serve round rolls on a hot platter garnished with lemon and sprigs of parsley.

Clifton Biscuits.

¼ cup walnuts.
1 cup flour.
1 cup coconut.
1 cup rolled oats.
¾ cup sugar.
¼ lb. butter.
1 tablespoon golden syrup.
1 teaspoon baking-soda.
2 tablespoons boiling water.

Method.—Melt butter and syrup. Pour into dry ingredients. Add soda and water. Put in dessertspoonsfuls on a tray, press flat with the fingers, and bake one-quarter of an hour.

Tomato Juice Cocktail.

Strained tomato juice, 1 pint.
Salt, 1 teaspoon.
Lemon juice, 1½ teaspoons.
Cider vinegar, 1½ teaspoons.
Worcester sauce, ½ teaspoon.
Tobasco sauce, 5 drops.

Method.—Combine and leave in cold place at least one hour before serving. Serve with lemon and mint garnish.

Harvard Beets.

Method.—Wash 12 small beets, and cook in boiling water until soft. Remove the skins and cut in cubes. Mix ½ cup sugar, ½ tablespoon flour, add ½ cup vinegar, and boil five minutes. Pour over the beetroot and let stand on the back of the stove twenty minutes. Just before serving, add 2 tablespoons butter.

Boiled Salad Dressing.

Salt, ¼ teaspoon.
Mustard, 1 teaspoon.
Sugar, 1½ tablespoons.
Flour, 2 tablespoons.
Pepper.
Egg yolks, 1 or 2.
Milk, ¼ cup.
Vinegar or lemon juice, ¼ cup.
Butter or dripping, 1½ tablespoons.

Method.—Mix together the salt, mustard, sugar, pepper, and flour. Beat the egg slightly, and to this add the milk and vinegar. Add to dry ingredients, place in a saucepan over hot water, and stir constantly. When mixture thickens like custard, add 1½ tablespoons of butter or dripping. Stand saucepan in cold water and beat for a few minutes, then pour into cold basin.

Waldorf Salad.

Method.—Cut a ripe apple into ½ in. cubes. Cut tender celery of an equal amount into small pieces. Combine with walnut meats and salad dressing. Place on lettuce leaves, and add dressing and a garnish of chopped nuts.

Other salad combinations which are garnished with chopped nuts or grated cheese and served on a lettuce leaf or a nest of shredded cabbage are: Apple and date; banana and peanut butter; pear and cherry; pineapple and cheese; pineapple, celery, and nut; rabbit and celery; tomato, salmon, and cucumber; stuffed date; cheese, celery, and nuts; potato and beetroot; cauliflower and cheese; stuffed celery.

Founders of Modern Agriculture.

J. W. WOODCOCK, Fields Division.

Cyrus H. McCormick.

THE invention of the mechanical reaper meant the beginning of a new era in the history of agriculture, and although several persons have been credited with this achievement Cyrus McCormick (1809–1884) is recognized as being responsible for the development of the modern reaper and binder. A practical reaping-machine was in fact invented by the Rev. Patrick Bell in Scotland about the same time as McCormick was working out the details of his machine in the United States of America, but it is not intended to enter into the controversy which is raised from time to time as to the priority of the two inventions.

Robert McCormick, the father of Cyrus, was a farmer in a fairly large way in Virginia, and he appears to have been an inventor of no mean ability. For many years the father had ambitions of inventing a reaper, but after building two machines which proved unsuitable for the work he gave up the idea, having worked at it for more than fifteen years.

Invention Succeeds.

It was then that Cyrus took up the task which his father had abandoned, and by adopting new principles he succeeded. He first invented the divider, then the reciprocating-blade, the fingers, the revolving reel, the platform, and the big driving-wheel. In 1831 the machine was perfected, and, upon being tried out, was proved a success.

For several years McCormick continued to manufacture reapers on the home farm, exploiting a large deposit of iron-ore nearby for his raw material. In 1847 he transferred his factory to Chicago and established a flourishing business, which by 1871 was turning out ten thousand harvesters a year.

The great fire during that year completely destroyed the factory, but McCormick, with amazing rapidity, rebuilt it and soon had the business back to its former dimensions. The tiny workshop in Virginia became the McCormick City in the heart of Chicago, and was the seed of the huge incorporation known to-day as the International Harvester Co.

Evolution of Machine.

Associated with McCormick in the evolution of the modern reaper and binder was Charles B. Withington, who invented an attachment for tying sheaves, although wire was used instead of twine. It was William Deering, McCormick's competitor in the manufacture of reapers, who modified the invention enabling twine to be used.

The advent of the reaper and its later evolution into the twine self-binder were epoch-making events in the agricultural world, and the machine still remains one of the most astonishing mechanisms ever devised by the brain of man. The harvesting of grain, hitherto one of the chief limiting factors in large-scale production, was made a comparatively simple process, and, although harvesting may have lost some of its picturesqueness with the passing of the scythe, those of us who have had to cut by hand and tie up in sheaves only a small area of wheat or oats have had cause to bless the invention which eliminated such back-breaking toil.

Fig. 1.—The old conception of a cereal harvest. Mowing corn with the scythe: aaa, swathes of corn; bbb, three mowers; ccc, three gatherers; dd, open sheaves; e, bandster binding a sheaf; ff, bandsters setting a stook; g, stook; h, man raker; i, hand stubble-rake; k, bound sheaf.

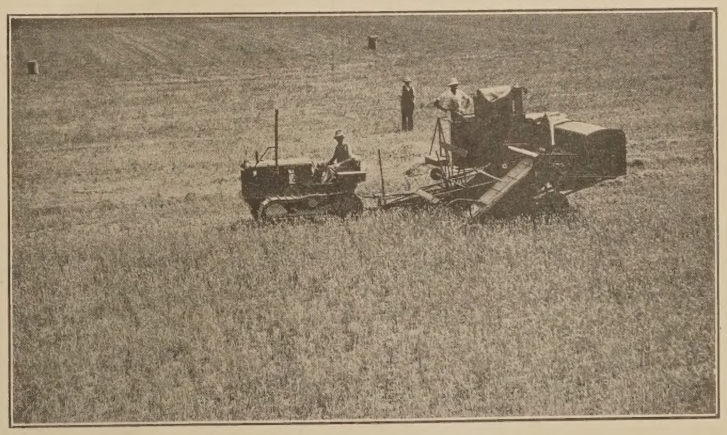

Fig. 2.—The modern method of harvesting.

[Photo by H. Drake.

Table of Contents—July, 1938.

	PAGE
Work of Rehabilitation (Esk Valley). *R. P. Hill*	1
Cavalcade of Agriculture. *W. J. Croucher*	7
Lay-out of Central Feeding-system for Pigs. *C. S. Dalgliesh*	10
Farm Shelter and Shade. *C. Walker*	12
Subterranean Clover Survey. *J. P. Beggs*	17
Vital Factors in Crop-costing. *R. P. Connell*	21
Which is the Best Baconer Carcass? *M. J. Scott*	23
The Pig Club Movement	24
Influence of Salt on the Flavour of Butter. *G. M. Valentine*	27
Citrus Pests: (2) The Citrus Borer. *W. Cottier*	28
Agricultural Regulations. *A. E. Morrison*	30
Lotus Major in Surface-sown Pastures. *K. M. Montgomery*	33
Northern Wairoa Demonstration Farm. *E. B. Glanville*	35
Liming in Otago. *W. R. Lobb*	43
Farm Practice and Management. *Fields Division*	46
Section for Irrigated Areas. *Fields Division*	57
New Zealand Pear-export Trade. *A. Powell*	58
Horticultural Instruction. *Horticultural Division*	59
Vegetables, Small Fruits, and Flowers. *Horticultural Division*	64
Work for the Month in the Apiary. *Horticultural Division*	67
Poultry-keeping Section. *Live-stock Division*	69
Young Farmers' Clubs. *S. Freeman, Editor*	71
Health Notes for the Farm. *Health Department*	80
The Farm Home and Kitchen. *Department of Home Science*	83
Founders of Modern Agriculture. *J. W. Woodcock*	87

And Miscellaneous Matter.

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